



*Design criteria for low cost housing in
Latin America's semi-tropical zones*

Case Study: Santa Cruz de la Sierra, Bolivia

"Think Globally, Act Locally"

Architecture thesis essay

Design criteria for low cost housing in Latin America's semi-tropical zones

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*To obtain the degree of Master of Science
At the faculty of Architecture, Delft University of Technology
Master directions Architecture and Building technology
Certificate Sustainable engineer*

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Acknowledgements

I would like to thank my supervising team; Robert Nottrot for his humour and support to develop the houses from urban scale till ornamental detail. Arjan van Timmeren for giving me input on sustainable development from global till local scale. Fred Veer for his endless trust, practical view on feasibility of plans and material knowledge. Guus Westgeest for his practical view on the way of constructing the houses. Ana Maria Fernandez-Maldorado for sharing her knowledge about low cost housing in Latin America, critical feedback on my project and interesting conversations.

I would like to thank some people related to the Solid House Foundation; Wim Stroecken for his enthusiasm and discussions about community based development. Jorike Schmal for our weekly discussions about aid, community development and social support. Tomas Viguurs for local knowledge exchange and our discussions about building materials, design criteria and aid. Berthe Schoonman for the help in preparing my trip to Bolivia. Geert Custers, for providing me with local information before my trip to Bolivia. Vincent Vroomans for providing local geological and vegetation maps. Mireille Velthuis for her curiosity and interest. And finally, the architecture think tank for helpful input before and after my trip to Bolivia.

I would like to thank many people in Santa Cruz who made my stay and research in Santa Cruz possible; First of all Jorge, Aida, Ingrid, Massiel and America Sensano for providing me with a home in Bolivia. You really made me feel part of your family. Secondly, Rafael Rios for helping me organise and structure my thesis. Alejandro Rios who supported my research in many ways and became a true friend. I will never forget the fun we had, especially with your car. Jorge Urioste for sharing your knowledge and also your friendship. The organisation Cedure, especially Isabella Prado for organising and joining the twelve interviews with the local inhabitants. Fundacion PAP, especially Elmer, for taking me to different meetings and places in districts 8 and 12. CidCruz, especially Marta for showing their project in district 8. Habitat por la Humanidad, especially Ramiro, for sharing his knowledge and showing their projects and even taking me to an inauguration of a couple of houses. The faculties of Architecture of the Universidad Autonoma Gabriel Rafael Moreno, Universidad Catholica, Universidad Privada Santa Cruz and the college of Architects of Santa Cruz for helping me execute my workshops. For sure, I did not mention many other people I met in Santa Cruz, but who helped me out, to them: thanks a lot!

I would like to thank Kees Baardolf for helping me construct the nodes. Gerrie Hobbelman, Roel Schipper and Peter the Vries for bamboo construction and jointing advice. Paul van Lindert for sharing his view on the development of houses in Santa Cruz de la Sierra. Rob Wiegiers of IBR consult, Leon van Paasen of Deltaris, Dominique Vosmaer of Nebasco and Charley Younge of Bamboo Information Centre for sharing their material knowledge.

Finally, I would like to thank my parents for providing an environment which made it possible to reach this goal. Marijn de Visser for support in translating the summery to Spanish. Coen de Visser for reviewing, discussing, being all ears and supporting my thesis project. Family and Friends for supporting the process till the end!

Summary

Santa Cruz de la Sierra, the case study city for this research, was an isolated, marginal and disconnected city for more than 400 years, from its establishment in 1622 until the 1950's. The gas and oil industry, as well as the agricultural industry, became very important from the fifties on. Additionally, big political changes occurred in Bolivia, which also became visible in the dynamic, modern Santa Cruz de la Sierra. In a much quicker process than the general Latin American city, Santa Cruz expands explosively. In 60 years this city changed from an isolated unimportant village into a global metropolitan zone with more than 1,5 million inhabitants generating almost 30% of the national income of Bolivia.

As in all modern cities, problems arise with respect to land ownership. The city planning department could not facilitate enough space for housing the migrants, and illegal invasions start to occur. The rich immigrants as well as the poor migrants developed the city. On the one hand the rich develop American-style closed-urbanisations, with all urban facilities included. The urban poor on the other hand, construct illegal neighbourhoods without facilities. This contrast between rich and poor grew. The rich live in the city centre, in their structured and organized houses, while the poor people live in less organized neighbourhoods in the periphery with their self-built constructions.

Santa Cruz de la Sierra in Bolivia, a semi-tropical city, is the case study for this research. The uncontrolled city development in semi tropical zones in Latin America is the main subject of this thesis. Specifically, a look at the current housing situation and housing possibilities is given. The goal of this research is to develop design criteria for sustainable and affordable housing for the lower income groups in semi-tropical zones in Latin America. With these design criteria a designer can better propose a local solution that will create more opportunities for lower income groups to develop. Together with the technical and spatial knowledge of a designer, an added value to the urban and housing quality in poorer areas of the city can be given.

The twelve in-depth interviews resulted in the bottom-up design criteria. Most houses in poorer neighbourhoods are self-built. The quality of these constructions varies a lot. By offering a designed self-constructible house, a higher quality product can be realised. The construction materials used to build the house should be portable and applicable by manpower and the building product should be applicable by unskilled people. Because the families with lower incomes realise their houses themselves, reparations and improvements can be done easily. In general, the lower income groups do not have a fixed income. Therefore, their houses should be extendable according to their needs, desires and financial possibilities. The different possible phases should be visible in the proposed design of the house, vertically as well as horizontally. Additionally, the minimal basis unit should not exceed \$5.000, - USD. Each extension should be affordable and cheaper than the basis unit.

The semi-tropical climate, with heavy showers, very cold southern winds, and a burning sun, influence the necessary building quality of the house. Besides, the high humidity level can downgrade the used building materials. The house serves as a protective shelter against the hostile climate. To create a comfortable house, the climate should be used in a positive way. For example, the north-west wind can avoid the development of mould, and the sun can help heat up water for showering or cooking. Sun light heats up the house and preferably should be barred out, but sun heat also helps the drying of materials after a heavy rain.

In Santa Cruz housing for the lower income group is considered an individual problem, not a collective one. By developing the neighbourhood as a community the people will learn that joining their forces will bring them more prosperity. In the design, the community development approach can be reflected by, for example, the development of new building products that will result in a small factory. Also, the community can be taught to use new building techniques so new types of employment appear. The end result will not only be a good house, but will also create the potential for economical development. The twelve interviewed families preferred an economic activity within their own parcels, but for many families this is still a dream. The development of a productive house; a house that facilitates, besides living, an economic activity, like a shop, a workshop, or cultivating plants for sale, will provide more potential for small scale economical development.

The interviewed families had showers, toilets, kitchens and washing facilities, but no waste water collecting facility. The waste water penetrates the earth and mingles with the groundwater. The polluted ground water is used as drinking water, causing diseases. Therefore, a good and sustainable water use solution is necessary. This could be combined with the development of the community, which should also be visible in the lay-out of the neighbourhood. One house can be individual, but when the houses in the street are connected or related to each other, a street with facades appears. The community will receive space to live like a community and life will take place on the border between private areas and public space.

From the global point of view or top down approach, environmental criteria to the design are formulated. When considering a construction material, one should not only look at the first destination. In other words, the building product should become part of a building, but thought should be given to possible usage after the use as a building material. The production of materials, the transportation of materials, and the application of materials into a building produces waste materials and pollutes the environment. Minimal pollution by the building materials should be important in the design decisions.

The traditional brick and the colonial roof tile are favourite building materials for the local inhabitants of Santa Cruz. The brick is still produced traditionally; by hand in a loam wood furnace. Taking the current expansion of the city into account, the demand of bricks will only continue to grow. A research into alternative building materials, that are culturally acceptable and sustainable, will be important. When choosing natural fibres and matrixes, the Food, Fibre and Fuel discussion should be taken in account. The extendibility of the homes was already mentioned as an important future value. All systems introduced in the design need to be evaluated on their future value. An investment in durable applications should have a long life span, especially for the lower income groups. For example, if a sewage system is introduced in the neighbourhoods, the complete infrastructure has to be built. An autonomous waste water system could be introduced in the design with a future possibility of connecting it to the sewage system.

These design criteria can help to make easier design decisions and also give structure to local research and better understanding of the social, economical and ecological situation. The list of design criteria is probably not complete, but should be a good starting point for any future follow up projects. The conclusion of this research is not a fixed set of design criteria, but a first attempt to structure bottom-up and top-down approaches in community based development process for a design.

Resumen

Santa Cruz de la Sierra, el estudio de caso para esta investigación, ha sido una ciudad aislada, marginal y desconectada por más de 400 años, desde su fundación en 1622 hasta los 1950's. Desde las cincuentas, la industria de gasolina y aceite, así como la industria agrícola, se hacen muy importantes. Además, grandes cambios políticos han ocurrido en Bolivia, que se hace visible en la dinámica y moderna Santa Cruz de la Sierra. En un proceso más rápido en que crecen las ciudades latinoamericanas en general, Santa Cruz se amplía altamente explosivo. Dentro de sesenta años la ciudad ha cambiado de un pueblo aislado e insignificante a una zona metropolitana con más de 1,5 millones de habitantes, generando casi el 30% de los ingresos del estado de Bolivia.

Como en todas las ciudades modernas, se presentan problemas con la propiedad de terreno. La oficina de planificación urbana no podía facilitar espacio suficiente para alojar los migrantes y las invasiones ilegales empezaron a ocurrir. Los inmigrantes ricos igual como los migrantes pobres desarrollaban la ciudad. Por un lado los ricos desarrollaban los barrios cerrados en un estilo americano, con todas las comodidades incluidas. Los ciudadanos pobres por otra parte, construyeron barrios ilegales sin comodidades. Este contraste entre los ricos y los pobres creció. Los ricos viven en el centro de la ciudad, en sus casas bien construidas y organizadas, mientras que los pobres viven en barrios menos organizados en la periferia con casas autoconstruidas.

Santa Cruz de la Sierra en Bolivia, una ciudad subtropical, es el estudio de caso para esta investigación. El desarrollo descontrolado de las ciudades subtropicales en América Latina es la asignatura principal de esta tesis. Específicamente, se fija en la situación actual de vivienda provisional y en sus posibilidades. El objetivo de esta investigación es desarrollar criterios de diseño por una casa sostenible y asequible para las familias de bajos ingresos en las zonas subtropicales de América Latina. Con estos criterios de diseño, un arquitecto puede proponer mejor una solución local que genera más oportunidades de desarrollo para las familias de bajos ingresos. Conjuntamente con el conocimiento técnico y espacial del arquitecto, se puede dar un valor añadido a la calidad de viviendas y barrios en las áreas pobres de la ciudad.

Las doce entrevistas profundas resultaban en criterios de diseño "bottom-up". La mayoría de las casas en los barrios pobres son autoconstrucciones. La calidad de estas construcciones varía mucho. Cuando se ofrece una casa autoconstructiva y diseñada, se puede realizar un producto de mejor calidad. Los materiales de construcción que se usan para construir la casa, deben ser portátiles y aplicables por mano de obra y el producto de construcción debe ser aplicable por personas no especializadas. De esta manera las familias con bajos ingresos efectúan sus casas ellas mismas, por lo que saben cómo hacer las reparaciones y mejoramientos. Generalmente, familias de bajos ingresos no tienen un ingreso establecido. Por lo tanto, las casas deben ser extensibles según sus necesidades, deseos y posibilidades financieras. Las fases diferentes posibles se deben presentar en el diseño propuesto de la casa, verticalmente así como horizontalmente. Además, el base mínimo debe ser menos de \$5.000, - USD. Cada extensión debe ser asequible y más barata que el base mínimo.

El clima subtropical, con lluvias fuertes, surazos muy fríos, y un sol ardiente, tiene influencia en la calidad mínima necesaria para las casas. Además, con el nivel de alta humedad, los materiales de construcción usados se deshacen más rápidamente. La casa sirve de refugio de protección contra el clima hostil. Para engendrar una casa confortable, se debe usar el clima de una manera positiva. Por ejemplo, el viento noroeste puede evitar el desarrollo de enmohecimiento, y el sol puede calentar el agua para la ducha y la cocina. Los rayos del sol calientan la casa demasiado, por lo que se excluyen los rayos del sol preferiblemente. Sin embargo, el sol también ayuda en secar los materiales de construcción después de lluvias fuertes.

En Santa Cruz las viviendas para las familias pobres son consideradas como un problema individual, y no como un problema colectivo. Cuando se desarrolla un barrio en su totalidad como una comunidad, la gente aprenderá que unirse da más prosperidad. En el diseño, el enfoque del desarrollo de la comunidad puede resultar, por ejemplo, en el desarrollo de nuevos productos de construcción y en una pequeña planta de producción. También, se puede enseñar la comunidad cómo usar nuevas técnicas de construcción, que pueden resultar en nuevos tipos de ocupaciones. El resultado final no sólo es una casa digna, sino también crea el potencial para desarrollar económicamente. Las doce familias entrevistadas preferían una actividad económica dentro de sus lotes, aunque para muchas familias esto solamente es un sueño. El desarrollo de una casa productiva; una casa que facilita encima de un domicilio una actividad económica, como una tienda, un taller, o la cultivación de plantas para la venta, ofrecerá más potencial para un pequeño desarrollo económico.

Las familias entrevistadas tenían duchas, baños, cocinas y comodidades para limpiar la ropa, pero no tenían una comodidad para recoger aguas residuales. Las aguas residuales entran en la tierra y se mezclan con las aguas subterráneas. Las aguas subterráneas contaminadas son usadas como agua potable, lo que provoca enfermedades. Por eso, es necesaria una solución buena y sostenible para el uso de las aguas. Se puede combinar este mejoramiento con el desarrollo de la comunidad, que también se manifiesta en la composición del barrio. Una casa puede ser individual, pero cuando las casas dentro de una calle están conectadas o relacionadas, se aparece una calle con fachadas. La comunidad recibirá espacio para vivir como una comunidad y la vida tiene lugar a la frontera entre los espacios privados y públicos.

Desde el punto de vista global, respectivamente el enfoque "top-down", los criterios de diseño medio ambiental están formulados. Cuando se hace una elección de materiales de construcción, todo el ciclo de la vida del material debe ser analizado. En otras palabras, el material de construcción tiene un pasado antes de la integración en la casa y también tiene una vida después. La producción de materiales, el transporte de materiales y la aplicación de materiales dentro un edificio causan desechos, que contaminan el medio ambiente. Minimalizar los desechos de materiales de construcción debe ser muy importante en hacer las decisiones de diseño.

El adobito y la teja colonial son materiales de construcción popular para los habitantes de Santa Cruz. Hasta ahora se producen el adobito de forma tradicional; con la mano en un horno de adobe. Previsto la presente expansión de la ciudad, la demanda de los adobitos crecerá. Una investigación hacia materiales de construcción alternativa, que son culturalmente bienvenidos y sostenibles, será importante. Cuando se elija fibras vegetales, la discusión sobre el alimento, las fibras y el carburante, debe ser evaluado. Todos los sistemas introducidos en el diseño tienen que ser juzgados a su valor futuro. Por ejemplo, la posibilidad de extender las casas ya ha sido mencionada como un valor futuro muy importante. Inversiones en aplicaciones duraderas deben que tener una vida larga, especialmente para las familias de bajos ingresos. Por ejemplo, cuando en el futuro se introduce una red de alcantarillado en los barrios, hay que construir una infraestructura completa. Preferiblemente, por el momento se puede introducir un alcantarillado autónomo, que se puede conectar en el futuro a la red de alcantarillado.

Los criterios del diseño pueden ayudar en hacer las decisiones del diseño más fácilmente y en estructurar una investigación local para un mejor entendido de la situación social, económica y ecológica. Probablemente los criterios de diseño no son completos, pero son un buen punto de partida para proyectos de continuación en el futuro. La conclusión de esta investigación no forma un cierto conjunto de criterios de diseño, sino forma un primer intento para estructurar los enfoques de "bottom-up" y "top-down" en un proceso de desarrollo que se basa en la comunidad para un diseño.

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Fig. 1.1 Map of Latin America with the location of Bolivia and the map of Bolivia with its 9 departments and its capitals (1)

1 Introduction

In a course focused on sustainable development of Africa I got the opportunity to interview experts in the field of social housing in Africa. Among others, I interviewed Wim Stroecken, director of the Solid House Foundation. Solid House Foundation (SHF) is a Foundation, founded in November 2003, which has as goal sustainable development of housing for lower income groups in developing countries by means of housing. SHF works together with local lower income groups and prefers to have them participate in the projects by taking responsibility organisationally, financially, and in the form of labour. Next to constructing sustainable housing, community based development is very important. Subjects like housing, education, economical development, health care, safety and community development are integrated in the projects.

Berte Schoonman, a project manager for Bolivia at SHF, concludes in her visiting report: "In Bolivia there is a great need for development of social housing concepts. Housing organisations, NGO's, different banks, as well as governments all conclude that a way of building that is quick, efficient, sustainable and relatively cheap is needed. The focus group is the lower and lowest income class in urban as well as rural context." At this moment SHF is constructing domes of concrete. The domes are cost effective and of high quality, in a technical sense, but difficult to extend and not always desirable to live in. One of the locations to develop new housing in Bolivia is in the city Santa Cruz de la Sierra. (See Fig. 1.1.) Some organisations in Santa Cruz de la Sierra are interested in the concept of SHF (building with the local people, community based development, making use of local materials and organisations), but not in their way of constructing: the dome. (2) A research in Santa Cruz de la Sierra on the current way of living and constructing was needed, resulting in a design proposal for social housing in this city. Together with Solid House Foundation and tutors of the Delft University of Technology, we decided to make this my final thesis subject.

Since the industrialisation from the midst of the 19th century, Latin American cities, like Santa Cruz de la Sierra, expanded a lot and are still continuing to grow. The rural groups have been forced to migrate to the cities, seeking means of survival, as the countryside has not been able to provide for the population surplus resulting from the higher growth rates. The migrants have appropriately assessed that life in the city offers them more hope for a better future than staying in the countryside where opportunities are scarce. The migrants bought affordable land from illegal land developers. Spontaneous neighbourhoods soon emerged at these locations. The urban poor have resorted to two main strategies: to occupy the deep slopes or land reserved from urban facilities inside the older spontaneous neighbourhoods, or to continue extending the urban boundaries in different informal ways. (3)

Santa Cruz de la Sierra in Bolivia, a semi-tropical city, is the case study for this research. This city has the characteristic controlled and uncontrolled urban development. The uncontrolled city developments in semi tropical zones in Latin America will be the main subject of this thesis. Specifically, a look at the current housing situation and housing possibilities will be given. The main question to be answered in this thesis is:

What are the design criteria to develop a social, sustainable and affordable housing solution for the lower income groups in semi-tropical zones in Latin America?



Fig. 1.2 The city Santa Cruz de la Sierra in 5 years, drew by a student of the Autonomic University Gabriel Rafael Moreno (UAGRM)

The goal of this research is to develop design criteria for sustainable and affordable housing for the lower income groups in semi-tropical zones in Latin America. With these design criteria a designer can better propose a local solution that will create more opportunities for lower income groups to develop. Together with the technical and spatial knowledge of a designer, an added value to the urban and housing quality in poorer areas of the city can be given.

This thesis is structured as follows. First the current urbanisation process will be described, starting at Latin American scale to the scale of Santa Cruz de la Sierra. Chapter two will deal with the current way of living of the urban poor in Santa Cruz de la Sierra and their preference in housing and constructing. After the current situation, the local housing solutions executed by different organisations will be given in chapter four. Chapter five will deal with the climatic circumstances and the influence on housing and in chapter six sustainable criteria for social sustainable housing will be given. In chapter seven the conclusions in form of a list of the important design criteria for developing social sustainable housing for lower income groups in semi-tropical zones in Latin America will be given, concluding with the recommendations in chapter eight.

This thesis report will focus on the Architectural aspects of social housing in Latin America on a sustainable way. In the booklet "Sustainable building products for the lower income groups of Santa Cruz de la Sierra in Bolivia" the Building Technology aspects will be expounded. More information about the historical urban development of Santa Cruz can be found in the booklet "Urban Development of Santa Cruz de la Sierra". The design will give a local embedded designed answer to the more general answers. The three booklets together with the final design drawings and models are the end products of the master thesis in Architecture as well as in Building Technology with a sustainability annotation at the Delft University of Technology.

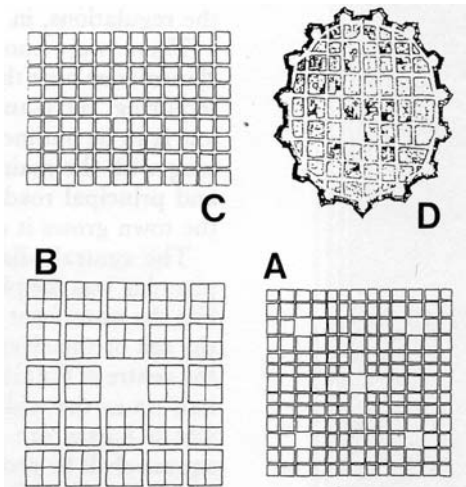


Fig. 2.1 The Laws of the Indies: four examples of minimalist city gridiron 'plans'. (4)
 A, Guatemala (1776);
 B, Concepcion (1765);
 C, Mendoza (1651);
 D, Trujillo (1760), which is an extremely rare (Perhaps the only instance) of Spanish plan following the Italian 'ideal city' pattern.

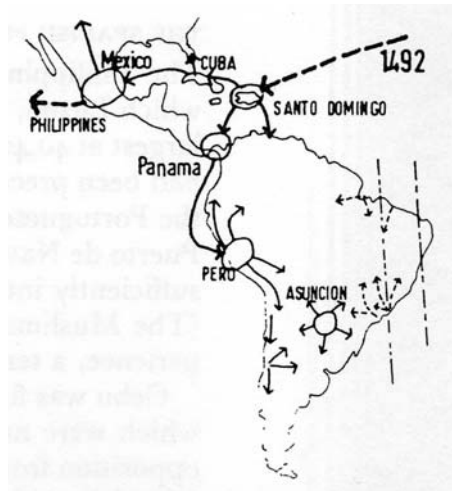


Fig. 2.3 The Spanish Latin American empire locating the sequential centres of conquest (4)



Fig. 2.2 Latin American system of cities in (3)

2 Urbanisation process

With the colonisation of Latin America many cities appeared, leading the Spanish to develop the 'Laws of the Indies', which was officially introduced in 1681. (4) Characteristic about these laws were the regular gridiron street blocks, centred on the main plaza, around which several major civic buildings were grouped. The great majority of the cities founded in the colonial period have grown into the present-day distorted versions of those town planning principles of the imperial period.

Santa Cruz de La Sierra, one of the many cities founded in the colonisation period, was first founded in 1561 by Ñuflo de Chávez, a Spanish Captain. After conflicts with the indigenous population, the complete town was moved to a number of other locations. Finally, in 1622 the city was founded on its present location on the banks of Piraí River.

Nowadays it houses more than 1,5 million people in a gridiron, but also radial and ring structured city.

Worldwide more and more people are moving to the cities, rich as well as the poor. This urbanisation process is a social process as well as an economic and territorial one. It transforms the role of the family, relationships within families, and concepts of individual and social responsibility. It changes our social and urban structure. The rich develop the well organised centres and closed urbanisations. The poor develop the space in between. In this chapter the uncontrolled development of cities within the urbanisation process in Latin America and Santa Cruz specific will be described.

2.1 Latin America

Most of the important Latin American cities were founded by the Spanish in the 16th century, consolidating the occupation of those territories, and establishing the maritime and land routes that would unite the colonies among themselves and with Spain. In many cases, the mining industry gave rise to the establishment of the colony's most important cities, in terms of numbers of inhabitants. (4) By the end of the 16th century the urban classical model in the Spanish colonies in America got its definitive form: a generally square grid of approximately 100 meters, with streets of the same dimensions in both directions. The town's life was centralized around the main plaza; an empty block in the grid surrounded by the main buildings: the church, the palace of the main authority and the municipality. The strict spatial separation between Spanish and indigenous population was a characteristic of the model too. The areas built for the Indians, called "cercados" (literally walled cities) or "barrios de indios" (Indian neighbourhoods) where outside the regular grid. (3)

At the beginning of the 17th century, relations between Spain and its colonies, as well as the relations amongst the colonies themselves, had conformed to a system that did not permit major innovations. The infrastructure between cities showed almost no modifications, especially in the continent. Lines of maritime and land transportations were badly maintained and not extended, the continent was an immense void. (5)

The population of the Spanish colonies in America grew slowly. Between 1600 and 1800 it doubled or sometimes tripled, and the tendency toward population concentration continued in principal administrative cities, in ports of continental importance, and in most productive mining centres. Life during these two centuries was monotonous and barely interrupted. Constant pestilences and plagues, together with general technological backwardness and limited production, were the reasons for the slow demographic and economical development. (5)



Fig. 2.4 Latin American system of cities in 1900 (3)

The 19th century was a period of great political changes due to the wars of independence from Spain, and the political unrest. The internal organization and formation of the Latin American nations went slowly. (5) The commercial activities of the English, the French and later on the US became dominant, and a new hierarchy of cities became apparent. Raw materials were exported to Europe, and manufactured goods were imported. Especially the southern cities of Latin America experienced a European immigration flow, accompanied by a wave of urbanisation. (3)

In the mid 1880s the English and French introduced the railroad in larger port cities. Until 1920 they expanded the network into the interiors of Argentina, Uruguay, Mexico, Chile, Cuba, Brazil and Peru; precisely the seven countries that had the largest port cities at the time. The railroad networks were mono centric, and centralized in the ports, with facilities for the exportation of the inner land products to Europe. (5)

The First World War isolated Latin America from Europe. Certain governments started encouraging the manufacturing of goods out of the raw materials, thereby initiating the first phase of industrialisation. Unfortunately, as soon as the European conflict ended, industrially powerful Europe resumed its control over Latin American markets. (5)

The 20th century can be characterized by two urbanisation flows. First, from 1920-1950 the already important port cities, especially in the southern cone of Latin America, started to become industrialized and attracted many people from the country side to the city. Although the 1930 crises reduced the immigration of Europeans to Latin America, the cities grew even quicker than before. Because of the crisis, the rural population was forced to seek employment in urban centres, especially in those undergoing industrial expansion. The migrants appropriately assessed that life in the city offered them more hope for a better future than staying in the countryside, where opportunities were scarce. But the amount of industrial jobs was not high enough to provide employment to the large numbers of job seekers. (3)

Great changes in the world economy after 1945 completely altered this situation. Most countries in the region engaged in a process of import-substitution industrialization, at the hands of national bourgeoisie and foreign enterprises. The most favoured locations for the establishment of new industries were the largest cities and the capital cities, because in that case the industries were close to the largest markets. This caused the second urbanisation flow from 1950-1980. Especially Caracas, Mexico City and Sao Paulo flourished in this period, due to oil revenues and the presence of a large industrial sector. (3)

The Latin American cities started to develop in a formal and informal way, which produced the disintegration of the classic colonial model. The formal city, created by the rich, continued to develop along the most important avenues connecting the city to the most favoured areas: close to commercial areas, providing their residents who were living in the periphery of the traditional city with accessibility to high-level urban facilities and centrality. The American way of life had become the ideal of the high and middle-classes. (3)

While the wealthy can afford legal and secure parcels with the appropriate infrastructure to build their dwellings and neighbourhoods on, the poor had to resort to survival and informal strategies to find a place in the city. The urban poor have resorted to two main strategies: to occupy the deep slopes or land reserved for urban facilities inside the older neighbourhoods, or to continue extending the urban boundaries in different informal ways. The informal areas have become important elements of the urban structure of the city and the major way of producing urban space. (3)

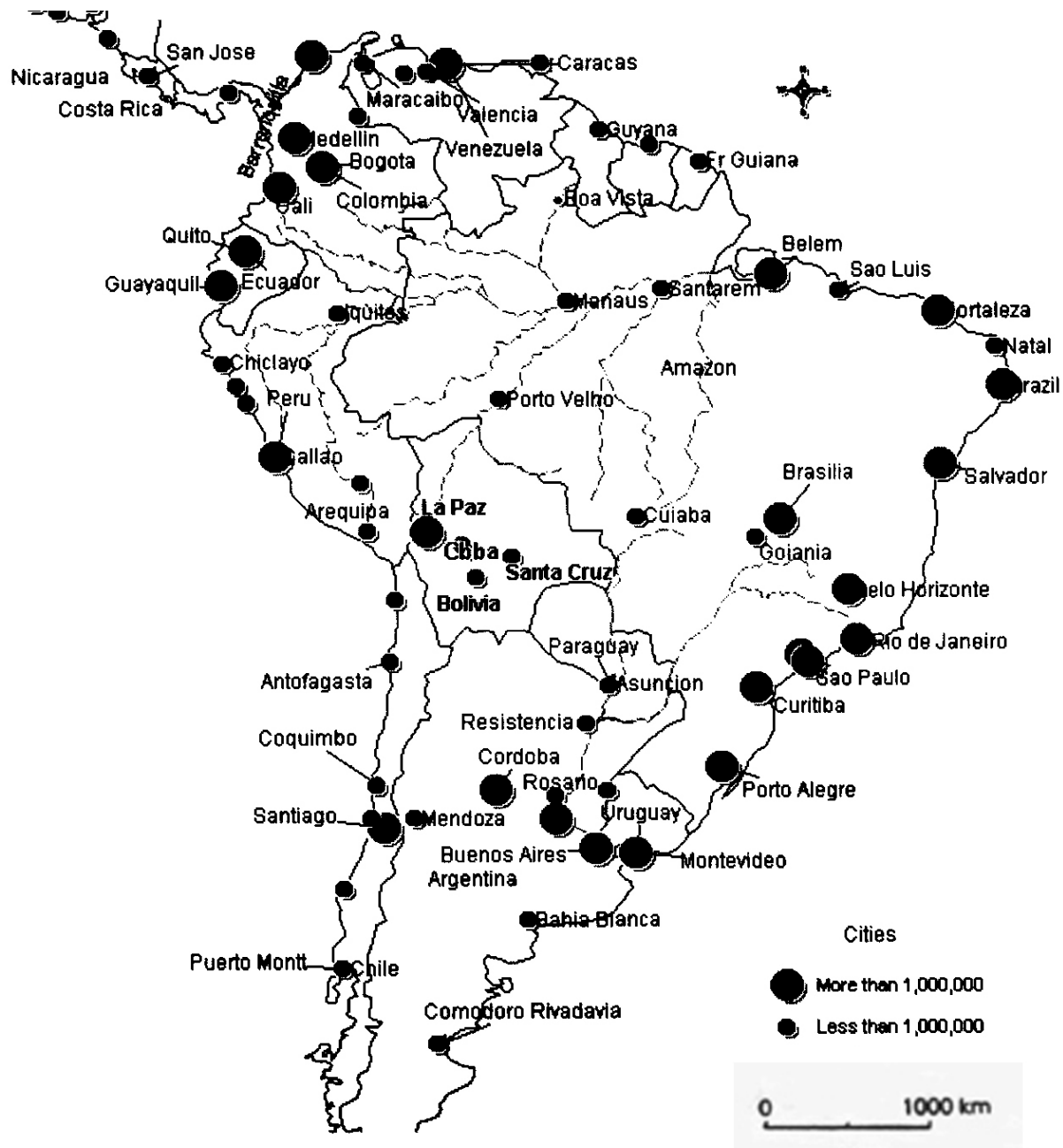


Fig. 2.5 Latin American system of cities in 1995 (1)

The last three decades have been characterized by radical transformations in the Latin American urban scene. New types of social interactions among urban actors have emerged, while new types and new locations of urban function have become visible. The transformations have resulted in new ways of production of urban space, characterized by peripheral and fragmented developments. (3)

In the 1980s, the so-called lost decade for Latin America, a strong economical crisis occurred, which stopped the extreme growth of most of the cities. The IMF and the World Bank forced governments to change the economic model, and to adopt the Structural Adjustment Policies, prescribing radical public-spending cutbacks, reduction of the public sector, privatisation, deregulation and liberalisation of trade and finance. The new policies had drastic social effects in both middle and low-income sectors, resulting in an even larger inequality between the rich and the poor. (3) The beginning of the 1990s witnessed a period of economic recovery in most countries, but is also known by the spectacular economical crashes. The Latin American economies remained dependent on foreign capital and were vulnerable to external crises, because of the openness of the national economies. At city level, the economic crisis meant low levels of, or no public investment, and almost no urban management, but an increased presence of foreign private capital in urban services. The old city centre is depopulating and high rise developments are visible in most big cities.

In 2001 Latin America counted 2 cities with more than 18 million inhabitants and 5 mega cities of more than 8 million. 49 Latin American cities had more than a million inhabitants at the turn of the millennium. These cities houses 43% of the Latin American urban population, confirming the preference of Latin Americans to concentrate in large cities. (3) The concept of towns as we have known traditionally, have changed during the twentieth century into urban agglomerations, with conventional neighbourhoods being islands in the middle of an ocean of unauthorized settlements. A large amount of the urban inhabitants live in the uncontrolled urban areas. (6)

The cause of the uncontrolled development of Latin American cities is a complex one, depending on many stakeholders with different interests. First of all you have the migrants who search work, a house and more opportunities to reach a better life. The commercial housing market is too expensive and the urban city planners do not make sufficient land accessible for the low and lowest income groups. The only options is settling down on prohibited land or take up residence in pirate urbanizations outside the urban radius or in estates not developed and equipped as required by the Urban Planning Councils. The larger cities of Latin America, regardless of the type of urban policies they have, have left the task of the distribution of urban land and its consequent consolidation in the hands of unscrupulous speculators or to the initiative of pauperized groups of dwellers. (6)

2.2 Bolivia

Prior to European colonization, the Bolivian territory was a part of the Incan Empire, which was the largest state in Pre-Columbian America. The Spanish Empire conquered the region in the 16th century. Most of the Bolivian cities originate from the Spanish colonial period and were based on the network of already existing Inca cities. In the colonisation period the high lands' minerals, like silver and tin, were exploited. Causing a high economic growth based on the employment of people with limited levels of education and precarious conditions of health and life. This exploitation of the high lands resulted in a profound division between the Western and Eastern regions in Bolivia, a very well connected and developed high land and an isolated disconnected, low developed low land. (1)

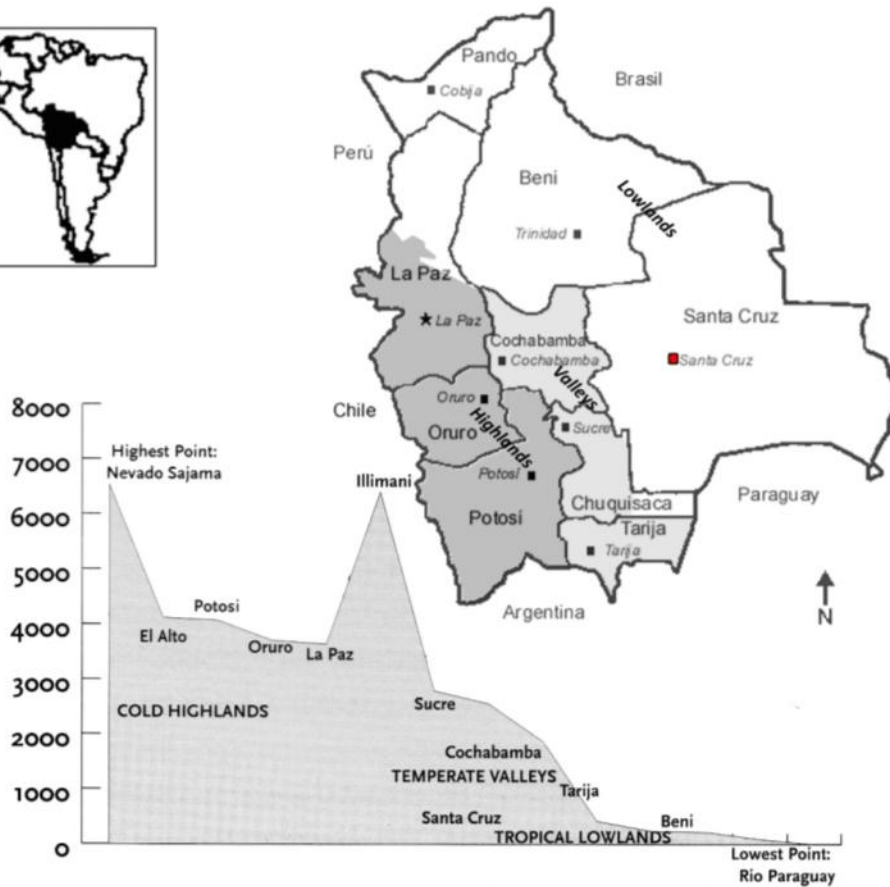


Fig. 2.6 Map of Latin America with the location of Bolivia. Map of Bolivia with its 9 departments, its capitals and location of the 3 climatically regions; highlands, valleys and lowlands Section of Bolivia with altitude above sea level.

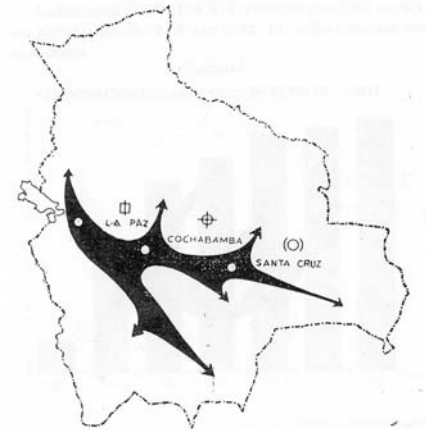


Fig. 2.7 National Economic Corridor

After declaring independence in 1809, 16 years of war followed before the establishment of the republic, named for Simón Bolívar, on August 6, 1825. The division between the east and the west maintained. Only since 1950 the Lowlands have been gaining importance due to the discovery of oil. In 1942 an economical development specialist from the United States, Mervin Bohan, proposed a diversification of Bolivian economy from a mining economy into an economy with primary focus on oil production and agro industry. The agro industry should produce for national consumption, while the oil industry should produce for international trade. (7)

The shift in economical focus proposed in plan Bohan caused a shift in spatial orientation of Bolivia. In the mining economy the cities Potosi, Oruro and La Paz were the main cities. With the movement into an oil production and agro industry the cities La Paz, Cochabamba and Santa Cruz became the National Economic Corridor. See Fig. 2.7. This shift was followed by a big migration flow from the high lands and other regions as well as another immigration flow from Europe after the Second World War towards the region of Santa Cruz. This resulted in a massive expansion of the urban area. (1)

The economical crisis of the eighties also reached Bolivia. In 1985 the president, Victor Paz Estenssoro, implemented the Structural Adjustment Policies with great spending cuts and privatization. This resulted in massive unemployment, especially in the mining areas Potosi and La Paz. However, the president stimulated the development of the largely uninhabited low-land regions by road building and the opening up of land for agriculture without harming the rain forest. This resulted in a second migration flow of the miners to Santa Cruz to find and create new work. They started living on big parcels in the outskirts of Santa Cruz and developed small businesses and shops. (8)

In 1990 gas was discovered in the department of Santa Cruz. Between 1993 and 1997 a second wave of political transformations into a neoliberal model were made, and all public companies were capitalized. These transformations opened the way to global external economies which produced an enormous effect on the region of Santa Cruz. (7)

Bolivia is still the poorest large country in South America. The urban growth rate is fairly high (3%) and there is an even territorial spread of urban centres with no large mega cities. The country is landlocked, with over 1 million hectare and had a population of 8.7 million in the year 2003. The country can be divided into three physical or geographical regions, the western high lands (6000-3000 m), the valleys (3000 - 1000m) and the eastern lowlands, covered with a humid tropical forest. (See Fig. 2.6.) Most of the Bolivia's population are indigenous groups such as the Aymara and Quechua who make up more than half the total population of the country. (9)

The majority of the indigenous people work as poor farmers in rural areas, but large numbers also live in the cities in low-income housing areas and work in the poorly paid informal urban economy. At the other end of the scale there is a small, but rich elite largely of Spanish descent, who live in the wealthy and leafy suburbs of the cities. Elite groups also work and control the rich extra-urban resources of Bolivia including fertile farmland in the central valleys and eastern lowlands, and the mining of metal ores (especially in the high lands), and increasingly oil and gas deposits (Tarija and Santa Cruz departments). Between the rich elite and poor majority there is a better off, but struggling middle class (about 35% of the population), composed mostly of Spanish and Mestizo groups, working mostly but not entirely in the generally better paid formal economy in the cities. (9)

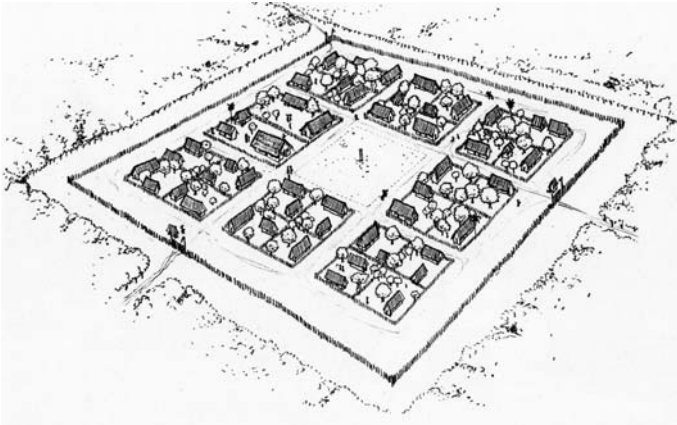


Fig. 2.8 Estimation how San Lorenzo should have looked like in the end of the 16th century (10)



Fig. 2.9 Territorial occupation by the Jesuits (11)

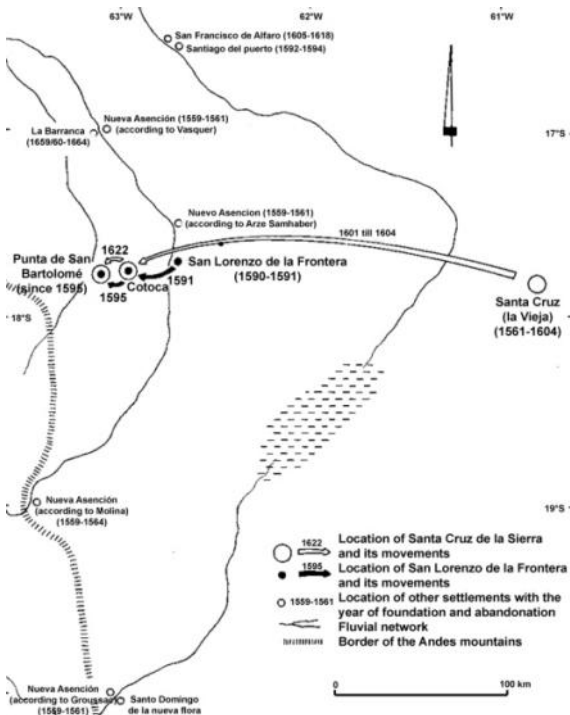


Fig. 2.10 Foundation on cities and movements in relation with the development of Santa Cruz de la Sierra (12)



Fig. 2.11 Map of Santa Cruz 1905 (13)

Both, the lowering of rural population and the rapid growth of urban citizens in Bolivia, have been fuelled by migration flows from the rural areas to the cities. A critical outcome of the high flows of poor rural people to the cities is that numbers of poor in the cities of Bolivia exceeded those in the rural areas. The inability of the Bolivian economy to generate sufficient formal sector jobs in recent years and the growing size of the city informal sector which has currently one of the highest levels of participation in Latin America have also been implicated in Bolivia's high and growing urban poverty levels. Additionally, there is no public housing provision; most of the incoming migrants end up living in high density, poorly serviced, self-built housing areas on marginal lands in the cities. (9)

2.3 Santa Cruz de la Sierra

In the search for "El Dorado" (golden dream land or paradise) Nuño de Chávez, a Spanish captain, founded the city of Santa Cruz de la Sierra in 1561, which means "Holy Cross of the Hills," in honour of his beloved native city in Extremadura, Spain. The location of Santa Cruz was chosen strategically between the two big rivers Rio Grande and Rio Paraguay. These were connected to the amazons as well as Rio de la Plata, which ends in the Atlantic Ocean. When in the future they would find "El Dorado", they could easily transport its treasures to the Spanish main land. Santa Cruz de la Sierra formed a new base for expeditions and was organized in the same way as all Spanish colonial cities, following the chess board pattern. Around 250 Spanish and 3000 Indians, who served the Spanish, lived in the city centre. In the "Encomienda"¹, a region 60 km around the city, 9000 natives were forced to work for the Spanish inhabitants. (12)

The location of the city was chosen for logistic and economic reasons, not for reasons of liveability. (12) The inhabitants were suffering from the extreme climate, and between 1601 and 1621 the inhabitants moved their city a couple of times. (See Fig. 2.10) Finally in 1622 Santa Cruz de la Sierra was merged with the city San Lorenzo de la Frontera, a city founded by Lorenzo Suárez de Figueroa who was also in search for the wanted "El Dorado". The new Santa Cruz was also developed following the classical model: The main square was surrounded by religious, judicial and administrative buildings. The houses were made of adobe walls with a roof of palm trees. The larger the distance from the main square, the more spacious the parcels became and the simpler the houses were. (14) The inhabitants of Santa Cruz needed to fight against their isolation from the continental and intercontinental trade network, because it was badly located geographically. In addition, no good road connections existed that permitted good connections with other cities. Almost no immigration of new Spanish blood occurred, and there was no big difference between the rich and the poor. The major part of the Santa Cruz population was a mix of Spanish and Indigenous people. It was an ethnically, but also culturally mixed society. (7)

In the end of the 17th century, the Jesuits came into the region of Santa Cruz and started constructing mission villages in the surroundings of the city Santa Cruz. The Jesuits did not only give catechization lessons to the indigenous people, but also helped to construct productive centres, with products that were exported to Peru and

¹ *Encomienda* was a system of appropriation of land in Spanish-America. Conquistadores were granted trusteeship over the indigenous people they conquered. The maximum size of an encomienda was three hundred Indians. Indian lands were to remain in their possession. The encomenderos had the authorization to tax the people under their care and to summon them for labour, but they were not given juridical authority. In return, the encomenderos were expected to maintain order through an established military and to provide teachings in Catholicism. (31)

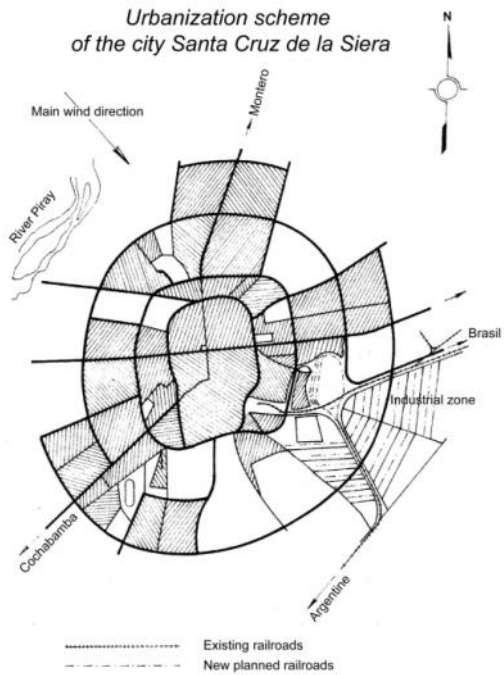


Fig. 2.12 Proposal Techint (10)

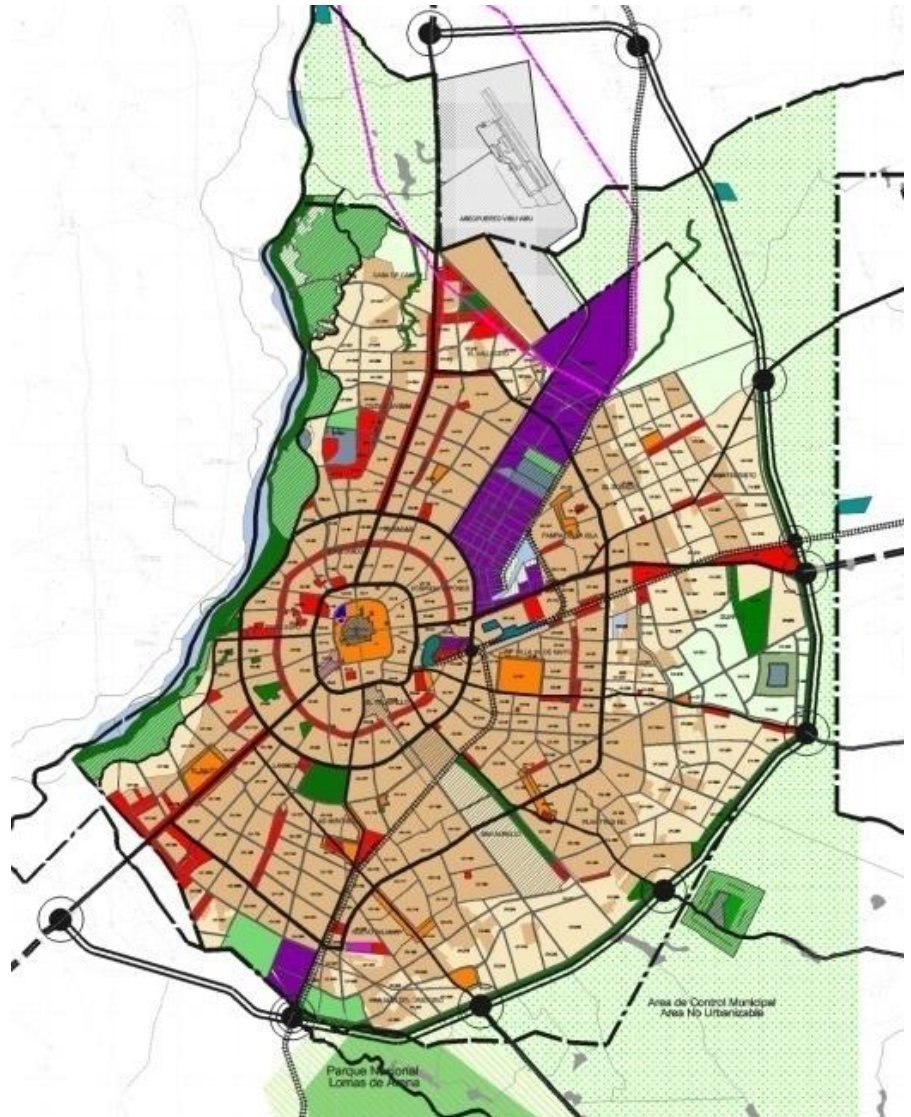


Fig. 2.13 Urban proposal for Santa Cruz 2005 (15)

Argentina. (16) Due to the presence of Jesuits, and later on Franciscan orders, Santa Cruz did not lose its central function. The city became a local centre for the distribution of indigenous product. This is the reason why Santa Cruz survived its remoteness and extreme poverty. (10)

After the independence war, fought between 1810 and 1825, Santa Cruz became the capital of the department with the same name within the republic of Bolivia. The following decades many legal fights took place about the ownership of land and new hierarchies of government. Not only the city Santa Cruz but the complete department remained disconnected and less developed in comparison with the Bolivian departments in the high lands. (17) From around 1850 till 1917 the rubber industry caused economical expansion, but no structural urban change. Finally, between 1932 and 1935 the region of Santa Cruz got national attention because of the "Chaco war", a war between Paraguay and Bolivia about the control of the "Gran Chaco" which was incorrectly thought to be rich in oil. The war resulted in a promise from the central government for a railway connection with Argentine and Brazil as well as 11% of the oil production found in the department.

This promise was marked and extended by the Plan Bohan. The economical empowerment of Santa Cruz was one of the main topics and created new possibilities for development and realisation of new infrastructures and public services for Santa Cruz. (7) The city had to be converted from an isolated traditional city into a modern development node. (10)

In 1957 Santa Cruz de la Sierra counted 40.000 inhabitants and did not have a single paved street. Therefore, in the fifties the local government started an urban committee for urban improvements and in 1958 a number of external offices were asked to make an urban proposal for Santa Cruz. The office Techint won the competition, with a plan inspired by the garden city and introduced a road structure of 4 rings and radials for better traffic connections. Next to the new structure, it also included drinking water, a sewage system, electricity, telephone lines, street pavements and an industrial park. (10)

In the sixties and seventies the development and growth of the city was controlled by the department of urban planning. At the end of the seventies the urban planning department started losing control of the urban development, because of the enormous illegal ground owning and construction by the poor migrants. (10) Santa Cruz left its colonised and isolated image behind and became an important city on South American scale. (14)

In the eighties Santa Cruz doubled in number of inhabitants and tripled in physically used space. Because of the national economical and institutional crisis, almost no urban planning occurred. In 1990 gas was discovered in the department of Santa Cruz, which opened the way to global external economies which produced an enormous effect on the region of Santa Cruz. Nowadays all economical activities generated in the department are concentrated in the city of Santa Cruz. One can find industrial, commercial and financial activities, but also the exportation and importation of products, realized by the institutions that are seated in the city of Santa Cruz. (7)

In the nineties the urban planning department became better organized due to the better economical situation. In 1995 a complete integrated urban plan, developed by a group of different specialists, was presented. In 1999 a plan on province scale was made to better understand the connection of the city with its region. The analyses and plans highlighted the complexity of this city and the difficulty of realising these plans. (10)

In the last 30 years Santa Cruz has become the motor of the national economy of Bolivia. Nowadays, the city counts more than 1,5 million inhabitants and is the quickest growing and largest city of Bolivia. Despite the quick growth, the city continues to expand with a relatively low density and in a chaotic and uncontrolled way, resulting in a fragmented city. In 2006 a new urban plan was proposed with similar implementation problems as in 1995. Only this

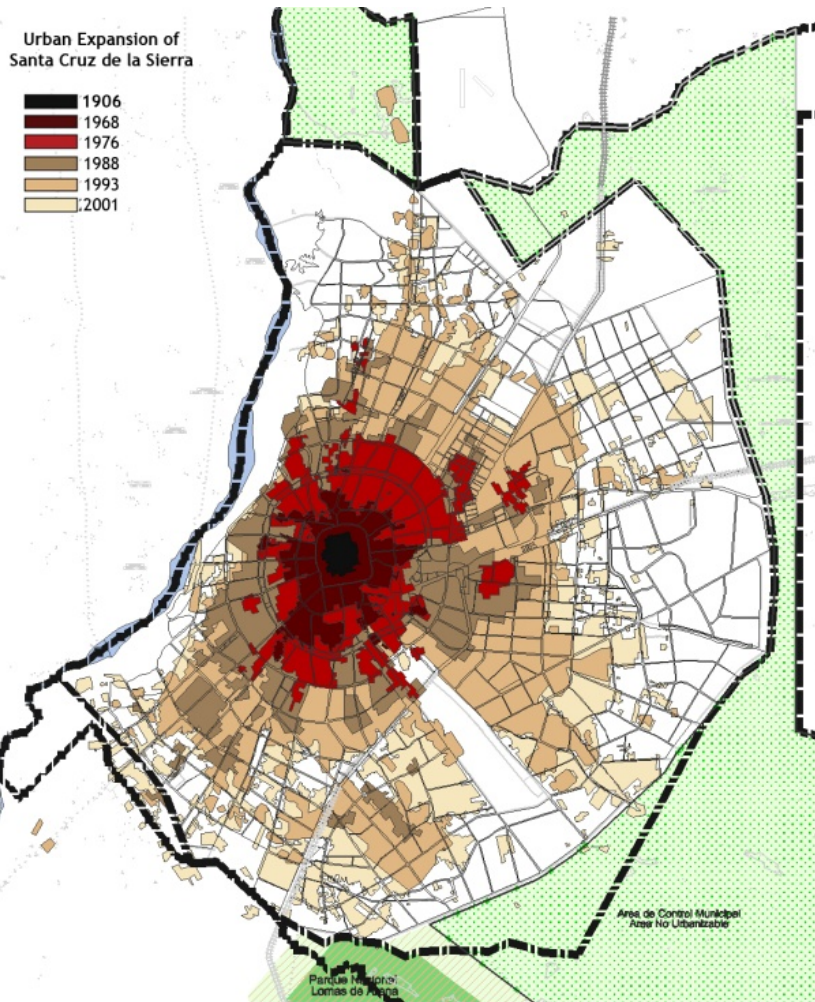


Fig. 2.14 Urban growth between 1906 and 2001 (15)



time the construction of a border to stop the growth of the city is proposed, because Santa Cruz does not have strong natural borders that can stop this low density growth. (10)

2.4 Conclusion

Santa Cruz de la Sierra was an isolated, marginal and disconnected city for more than 400 years, from its establishment in 1622 until the 1950's. It did not have much influence on the economical and political development of Bolivia. The urban establishment of Santa Cruz was similar to the general Latin American cities, but it developed an own local and precarious way of constructing. While most Latin American cities became important centres for trade with Spain during the colonization, Santa Cruz stayed undeveloped. The Jesuits, who immigrated in the 17th century, developed the region and with it Santa Cruz. Santa Cruz became a local centre.

In the 19th century, the beginning of the Republican period, many Latin American cities became important trade centres; first with Europe and later on with the United States. The size of the cities exploded due to migration and immigration. Santa Cruz was not part of the existing network of cities and remained disconnected. The introduction of the rubber industry was the first opportunity for the inhabitants of Santa Cruz to become more recognized. Unfortunately they did not succeed due to a lack of infrastructure.

The 20th century is marked by big political and spatial changes. The influence of the United States increased and immigration from the west was substantial. The introduction of industries made cities more attractive and the poor country side became less populated. The changes of the 20th century also became visible in the dynamic, modern Santa Cruz de la Sierra. In a much quicker process than the general Latin American city, Santa Cruz explodes. The gas and oil industry, as well as the agricultural industry, became very important from the fifties on. In 60 years this city changed from an isolated unimportant village into a global metropolitan zone with more than 1,5 million inhabitants generating almost 30% of the national income of Bolivia. And as in all modern cities, problems arise with respect to land ownership and that is when illegal invasions start to occur and fragmentation of large pieces of land occurs in places without planning.

In general, Santa Cruz is a Latin American city with the same main problems as other Latin American cities. However, because of its isolated location its development started later. The capitalist system favours central well connected locations, as remote locations imply higher transportation costs for products to reach the markets. The construction of highways and railways has helped to overcome this problem. A change in accessibility is the most important condition for a change in functional structure.

There are also typical aspects that mark the identity of Santa Cruz. The introduction of the plan Techint made Santa Cruz into an urban example in the sixties and seventies. This ring structure is still visible in the city and for the inhabitants the rings serve as a reference system for orientation and navigation. Santa Cruz is a tropical city with low density extensions, which is recognizable by the large amount of green in the city and by the lack of natural borders. Finally, the urban expansion of Santa Cruz is not only directed by the growth of the city, but also by development of its surrounding areas and the intervention of national government as Köster already concludes in 1980. (12)

For Latin America as a whole, the rich immigrants as well as the poor migrants are responsible for the development of the cities. On the one hand the American-style closed-urbanisations, populated by the rich, with all urban facilities included. On the other hand the urban poor, who construct illegal neighbourhoods without facilities. This contrast between rich and poor becomes bigger and bigger. Interestingly, this urban development has a similarity with the colonial cities of the 16th century. The rich live in the city centre, in their structured and organized houses, while the poor people live in less organized neighbourhoods in the periphery with their self-built houses.

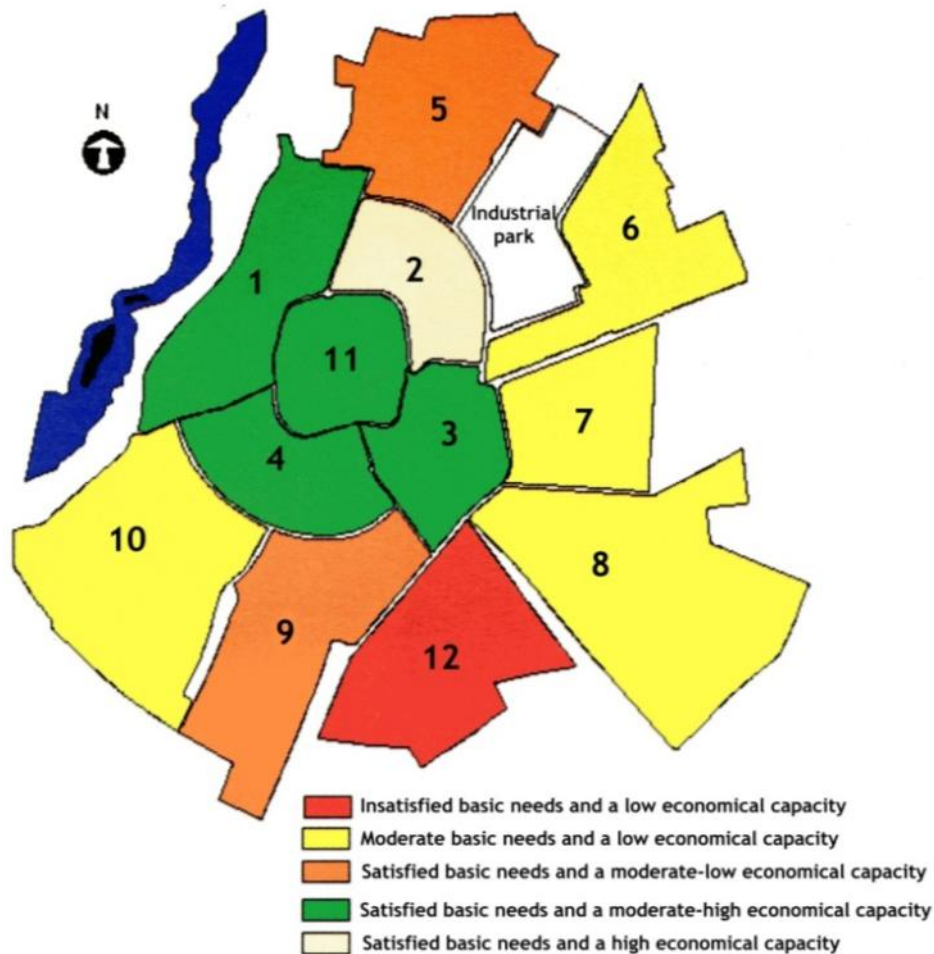


Fig. 3.1 Level of poverty in the districts of Santa Cruz de la Sierra (18)

Age of the Neighbourhood	Type of Family
New neighbourhood in new district. (D. 12)	Migrant family
	Original local family
New neighbourhood in consolidated district. (D. 8)	Migrant family
	Original local family
Consolidated neighbourhood in consolidated district. (D. 8)	Migrant family
	Original local family

Table 3.1 Differentiation of interviewed families

3 Housing of the urban poor in Santa Cruz

As explained in the previous chapter, a city develops in the rich as well as in the poorer areas. In this chapter the urban development of the poorer areas in Santa Cruz will be explored. High migration levels in the city, especially in the poorer districts, have widened the social gap between the migrants from the high lands and valleys, called “Collas” and the local low land inhabitants called “Cambas”. There are huge differences in income distribution. There is an environment where social tensions are putting at risk all the social integration processes and urban violence is constantly increasing. Within the urban growth of Santa Cruz de immigration groups from the high lands and valleys have an important role. Their transport and commerce networks have absorbed this type of activity in Santa Cruz. It is not that strange to see that the sellers in the fairs and market places are mainly migrant women who even keep their traditional highland clothes. (1) The results of investigations done in the city Santa Cruz and twelve in-depth interviews will give an inside view on how these people live.

3.1 Urban poor neighbourhoods

Santa Cruz de la Sierra is divided in twelve, in the future probably 16 districts. Every district is compartmentalised in Unidades Vecinales (UV) and every UV is divided into neighbourhoods. A neighbourhood has a chosen voluntary neighbourhood leader, who speaks up for the neighbourhoods’ wishes and rights. A neighbourhood leader is obligatory as recorded by the Bolivian law “Participation Popular”.

In 2006 a research was executed by “fundacion PAP²” about poverty in Santa Cruz de la Sierra. They looked at the level of basic needs and economical capacity. They concluded that district 1, 2, 3, 4 and 11 have satisfactory basic needs and a moderate to high economical capacity. The districts 5 and 9 have less economical capacity, but still satisfactory basic needs. Districts 6, 7, 8 and 10 have low economical capacity and moderate basic needs, while district 12 even has unsatisfactory basic needs. The districts 6, 7, 8, 10 and 12 showed to be the poorest areas of Santa Cruz; Poor on economical capacity as well as on basic facilities. (See Fig. 3.1) (18)

During the stay in Santa Cruz de la Sierra a small research was done in cooperation with Cedure³, a local NGO, about how the poorer families in these districts live by means of twelve in-depth interviews. We chose districts 8 and 12 as research areas, because of their difference in consolidation and because we could make use of an already existing network of neighbourhood chairmen. From the poorest districts, district 8 is the oldest as it already exists for 25 years. District 12 is the newest district, which appeared in 1995. In both districts, the neighbourhoods close to the city centre are well consolidated, while the remote neighbourhoods are lacking many urban services and facilities. The level of consolidation was the first parameter for the choice of families. The second parameter was the differentiation between migrants from other departments and migrants from the department Santa Cruz, called originals, resulting in a total of 6 different groups. (See Table 3.1)

District 8 and 12 are different of age, which is visible in the used surface and amount of people living in there. District 8 has a used area of 2.637 ha, district 12 only 1783 ha. District 8 has more inhabitants and is the oldest one of both. In Fig. 3.2 you can see the population growth of districts 8 and 12. Both are growing rapidly with more or less the same speed, but district 8 has almost double the number of inhabitants. (19; 20)

² Fundacion PAP is a non-governmental organisation who works on the development of the poorer urban areas in Santa Cruz. Fundacion PAP works on a neighbourhood level and tries to construct, together with the local inhabitants, a united society with respect, equality between men and women, active participation, social control and improvement of the lives of the poor people.

³ Cedure is a non-governmental research organisation which researches the rural and urban development in the district of Santa Cruz.

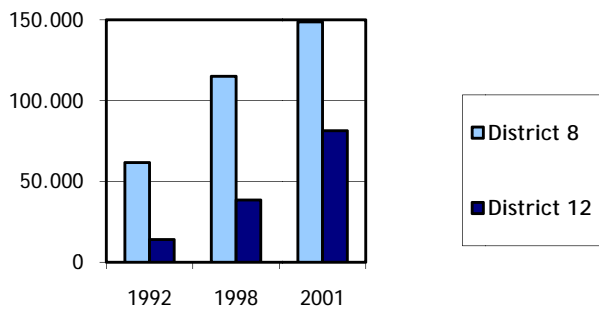


Fig. 3.2 Population growth of district 8 and 12

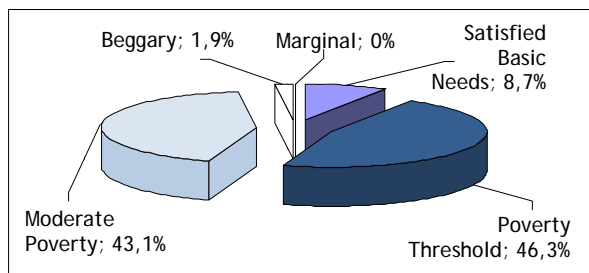


Fig. 3.4 District 8; Poverty (19)

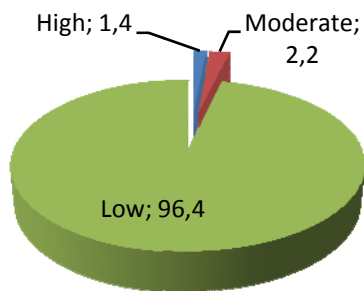


Fig. 3.5 District 8; Economical capacity (19)

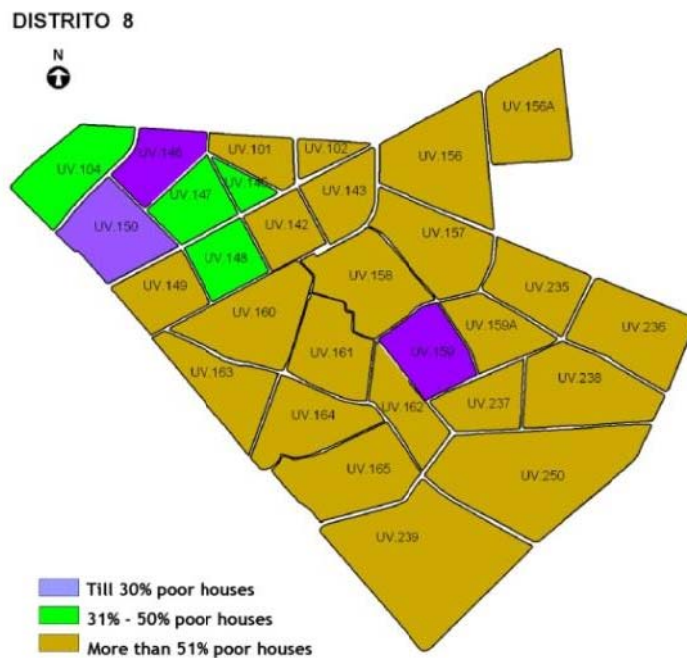


Fig. 3.3 District 8; Poverty distribution (19)

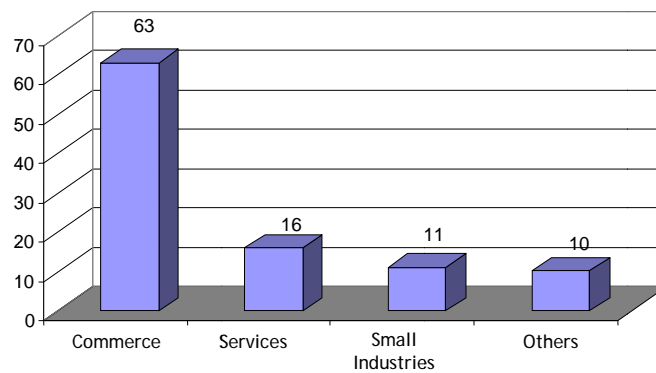


Fig. 3.6 District 8; Economical activities (19)

District 8; "Plan 3000"

District 8 was found after an awful flood of the river Piraí in March 1983, which made 3000 families homeless. The government gave these families a new piece of land on the other side of the city and established the neighbourhood Plan 3000. Unfortunately, these families still don't have the official right of ownership, even after 25 years.

Around this neighbourhood many new neighbourhoods appeared. Many of the inhabitants occupy illegal parcels, bought from illegal brokers otherwise they have been appropriating the land illegally. Official parcels are too expensive, although having official right of ownership includes the possibility to get loans or mortgage and of course the security that nobody will remove you from your parcel. A small disadvantage is that you have to pay taxes, but those will be used for urban improvements.

In district 8, 45% of inhabitants live in conditions of extreme poverty and 55% live in conditions of moderate poverty and have at least satisfied basic facilities. Respect to the economical capacity only 1,4% of the inhabitants of district 8 has high economical capacities, 2,2% moderate economical capacity and the majority of 96,4% has a low economical capacity. In Fig. 3.3 the distribution of poverty is presented. For example UV.104 is closer to the city centre situated and exists longer. Therefore, it is more consolidated and has a lower poverty rate than UV. 250. (19)

Most of the economical activities are in the informal sector and occur in the consolidated areas and around asphalted roads. Fig. 3.6 shows that 63% of the economical activities in district 8 are commerce, which can be having a small neighbourhood shops, selling dinners or have a bar. 16% of the economical active inhabitants in district 8 offer services, like car reparations, hairdressing, technical services, and internet services. Small industries, like woodwork shops, sewing workshops, bakeries, mattress factories and shoemaker's shops, cover 11% of the economical activities. This shows the preference for commercial economical activities. (19)

District 12; "Nuevo Palmar"

District 12 is a young district founded officially in 1995, and is one of the quickest growing districts and also houses many migrants. Most of the migrants, coming from different departments in Bolivia, first rented a room in other areas of the city before being able to buy a piece of land for themselves. Also here a clear distinction can be made between consolidated areas close to the city centre or around asphalted roads, less consolidated areas in between and new settlements on the border of the city.

From the poverty research done in 2006 by fundacion PAP, only 9,1 % of houses in district 12 have a satisfied basic service level, 49,1% of the inhabitants live in a moderate poverty levels, 40,1% in poverty threshold and 1,6% in beggary level. (20) The economical activities in district 12 consist for 64% out commerce like small neighbourhood shops, sale of dinners, bars and cafes, bakeries and similar activities. 15% of the economical activities are services, like the letting out of goods necessary for social events, locksmiths, nursing, hairdressing salons and other services. The small industries represent 9% of the economical activities in district 12 and are in form of sewing workshops, woodwork shops, shoemaker's shops, artisanal shops and similar activities. (20)

In the distribution of poverty and economical capacities there does not seem to be much difference between district 8 and 12. In general one could say the closer to the city centre or asphalted roads the more consolidated the area's are.

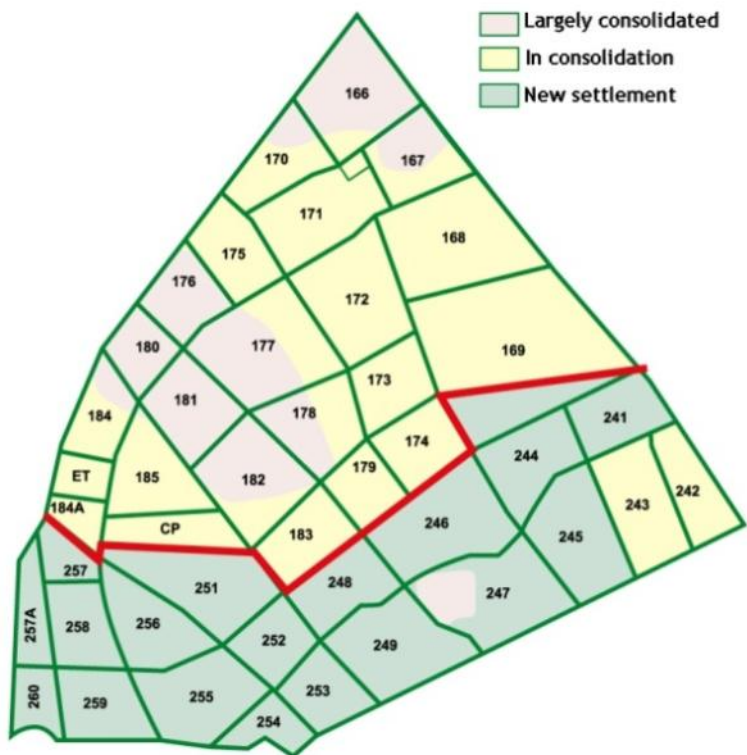


Fig. 3.7 District 12: Unidades Vecinales and the level of consolidation (20)

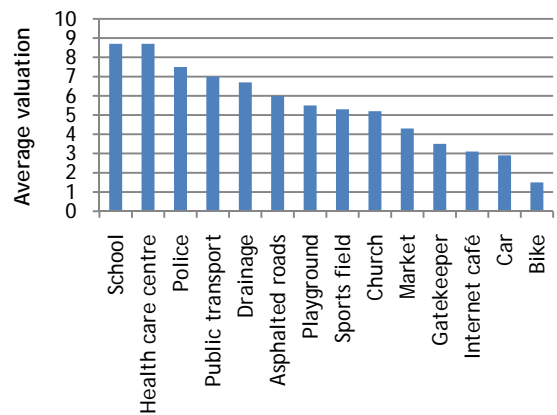


Fig. 3.8 Average valuation of aspects outside the house

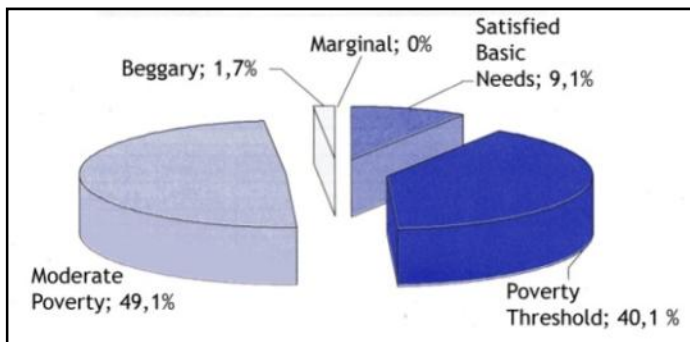


Fig. 3.9 District 12: Poverty (20)

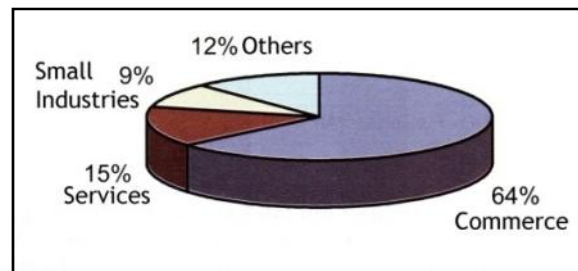


Fig. 3.10 District 12: Economical activities (20)

3.1.1 Urban facilities

The quality of an urban area is not only measured by the poverty level and economical capacities. The quantity and quality of neighbourhood facilities also presents the level of development and consolidation. The provision of public schools, health care, sport fields, police stations, waste collecting and so on.

During the interviews held in April and May 2008, the twelve families were asked to order some of the aspects that are important to have inside a neighbourhood. As can be seen in Fig. 3.8 most important are education and health care facilities, followed by the presence of police in the neighbourhood. Due to the uncontrolled growth of this city, the shortage of social facilities and a high unemployment rate, the safety of the neighbourhoods is at a low level. Especially in poorer district the amount of youth bands is enormous in comparison with the amount of police stations.

From the twelve families interviewed, four owned a car and two owned a bicycle. These private transport means were mostly used for the jobs they executed, like taxi driver or work not reachable by public transport. All families used public transport to move around in the city for shopping or going to work and also valued this mean of transport much higher than private transport equipment.

In the interviews it became quite clear that the quality of live does not only depend on the quality of housing, but also on the quality and quantity of neighbourhood functions. The involvement of the local neighbourhood inhabitants in developing these neighbourhood functions is of great importance. Some of the interviewed families participated in the construction of neighbourhood functions, of which they expressed pride as it created a neighbourhood connection. This subject will be further explored in chapter 6.1.

3.1.2 Urban services

Next to neighbourhood facilities, the families make use of infrastructural services like drinking water, electricity, garbage collection and telephone lines. Electricity and water supply are relative cheap branches of infrastructure, which makes commercialization of these services easy, especially for the very low income levels. Drainage, street pavement and sewerage are utilities are expensive infrastructures and their costs per dwelling are dramatically influenced by the urban lay-out and the housing density. The latter, favourable urban planning and adequate densities are lacking in the peripheral, spontaneous environments of the cities.

Fernando Prado Salmon⁴ explains in an interview about some of the problems they experienced with executing the urban plans in the city of Santa Cruz. "The poor migrants occupy a piece of land that is not theirs. After constructing their houses they demand that the municipality facilitates the neighbourhood facilities. Most of the time spaces for neighbourhood facilities are not created and repartition of the parcels is necessary. The repartition occurs in discussion with the inhabitants. In these cases urban planning happens afterwards, not before. Most urban poor have access to drinking water, electricity, public transport and neighbourhood facilities, but their houses and sewage systems are an individual problem, not a communal one." (21)

⁴ Fernando Prado Salmon is the urban development specialist in Santa Cruz de la Sierra.

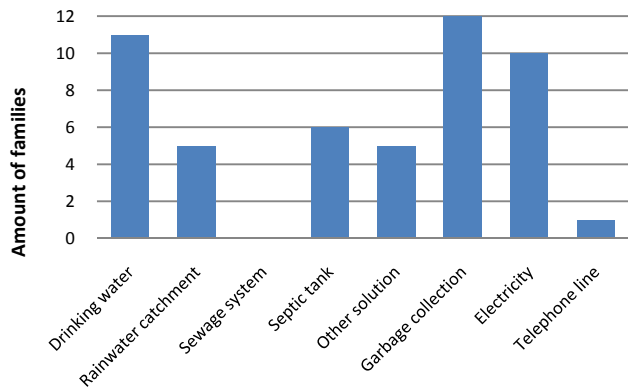


Fig. 3.11 Urban services

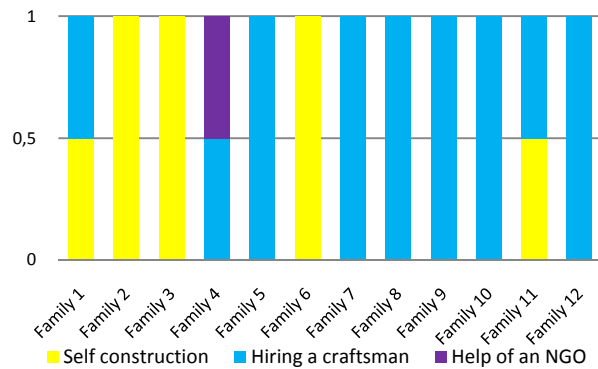


Fig. 3.12 Construction method



Fig. 3.13 Temporal shower and toilet

In district 12, the drinking water service of SAGUAPAC reaches around 90% of the parcels. In district 8 three cooperatives are active so a clear percentage cannot be given, but probably it reaches a similar percentage as district 12. (19; 20) From the twelve families only one did not have its own water tap from a water cooperation, but got the water from its neighbours. Besides the supply of water from a cooperative, some families caught rainwater to clean their cloth or car. The used water from cleaning and cooking is absorbed by the soil. None of the families were connected to a sewage system. Half of them used a septic tank to gather the waste water. The others dug a hole in the ground. One family did not have a toilet, because their parcel was very wet; with one tropical rain the waste water would be floating around. They visited the local market around the corner to go to the toilet.

The electricity network in district 12 as well as district 8 has a covering of 95%. From the twelve families interviewed 11 had an electricity connection. Only one family got the electricity from its neighbours. Collection of garbage was quite regular with all the families. The cooperative for garbage collection passes by between 2-3 times a week. Unfortunately, the garbage is dumped at the city borders. One of the families lives on one of the older garbage dumps. Which was once a garbage dump, is now sold as a place to live.

3.2 Twelve Dwellings

When designing for the urban poor, you have to understand how people live nowadays and how they prefer to live. In this chapter you will be taken to two different districts in Santa Cruz de la Sierra in Bolivia where the settings of twelve families will be described.

Most of the families that move to Santa Cruz first hire a room or move in with a family that already has a house, before settling down themselves. De commercial housing organisations in Santa Cruz do not offer low priced houses for the lower income groups; only parcels far from the city centre are affordable. After earning some money, the families buy a piece of land from a land broker, paid in monthly terms during a number of years, or occupy a parcel. Not all brokers are reliable, and many families end up living on parcels without having official papers. From the twelve families we interviewed, only five said to have official papers of the parcel, while others were having their papers in transfer. In a research of 444 families done by CidCruz⁵, 30 % had their official papers while 70% had their papers in transfer. (22) This is a general legal problem, and affects not only the poorer inhabitants, but also the financial possibilities of a municipality. That is because every owner of a parcel with official papers has to pay taxes, which will be used for construction of urban facilities and infrastructure.

After buying a piece of land, some of the interviewed families started constructing immediately, while others first finished paying off their loan. Those families that immediately inhabited the parcels often first constructed a precarious simple construction. Three of the families we interviewed also asked for a loan to pay for their constructions, but most of them collect building materials over time, until there is enough for another extension to their homes. The constructions made out of bricks were mostly realised by bricklayers, but constructions made with other materials were done by the owners themselves. Only one family got help from an NGO, who constructed a bathroom with septic tank.

⁵ CidCruz is a local centre for research and documentation in Santa Cruz, who research the social and economical development of people in the poorer districts of Santa Cruz. In 2008 CidCruz worked together with the 200 neediest families living in the district 8, to construct bathrooms, kitchens and rooms. For the election of the families they performed a research. The data from this research will be referred to in this thesis.

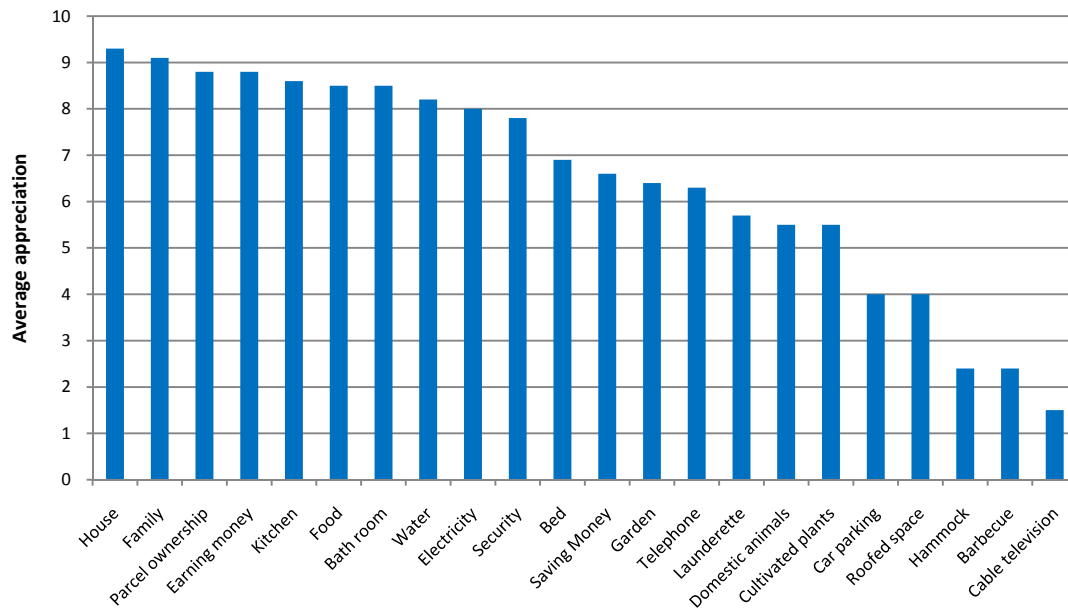


Fig. 3.14 Average appreciation of aspects in and around the house



Fig. 3.15 Construction with loam, sheets of corrugated iron and plastic cloths

It is very striking that all families constructed their houses in stages. There is no clear line between the time the family owned the parcel and the level of consolidation, because financial possibilities and demand for space also influence this development. In general, there is a certain characteristic development. The first construction is often a single roomed space with an outdoor gallery. This single roomed space is often used as a kitchen as well as a dormitory. In the beginning, a pit latrine serves as toilet and a garden hose as shower. Some extend their single roomed space with a more temporary space for the kitchen. Finally, on every parcel one could find a washbasin where laundry could be done.

In all the researched houses, the construction of the living areas and the bathroom was separate. The bathroom was mostly located at the back or at one of the sides of the parcel, but never in the front, probably because of the bad smell of the pit latrine and waste water. Horizontal extensions were mostly made as a continuation to the first living area. These second constructions functioned as extra sleeping room for the children, a kitchen or sometimes a better bathroom with a septic tank. Vertical expansion was only taken into account by one family. This family constructed the first floor and a stair to the second level. The floor of the second level functioned as roof because this extension was not yet realised. The flat roof caused leakage during tropical rains; therefore most families had a pitched roof to prevent leakage. Besides, at this point in time vertical expansion does not seem to be very important in Santa Cruz, because of the low density.

While economical activity seems to be important in the lower income group neighbourhoods, only one of the families we interviewed had a workshop on its parcel. Three other families facilitated social neighbourhood functions. Although the families didn't have economical activities on their parcels, half of them would like to have, or were planning to have, an economical activity within their parcel boundaries. Economical activities can also be generated by cultivation of plants or keeping domestic animals. Many of the families cultivated plants or had chickens or geese. The fruits, vegetables, meat and eggs are mostly produced for personal usage; only three families sold these products in the neighbourhood or on markets.

The families were asked to order pictograms of different aspects in and around their houses, so a better understanding of their priorities and appreciation could be given. In Fig. 3.14 one can see the end results. Having a roof above your head, a family, ownership of a parcel and earning money was perceived as very important. The basic facility spaces like a kitchen and a bath room, together with the availability of food, water and electricity were perceived as important as well. Also, having a feeling of security scored quite high, which was also perceived by the high amount of dogs and geese in the neighbourhoods; Ten out of the twelve families kept at least one dog and a couple of geese.

3.2.1 Building materials and Methods

In the in-depth interviews we asked the families with which materials they built and what kind of building materials they preferred. CidCruz also analysed which building materials were used by the 444 families they interviewed, for constructing their kitchens, bathrooms and living rooms. In this way we can have a more general picture of the currently used building materials and methods.

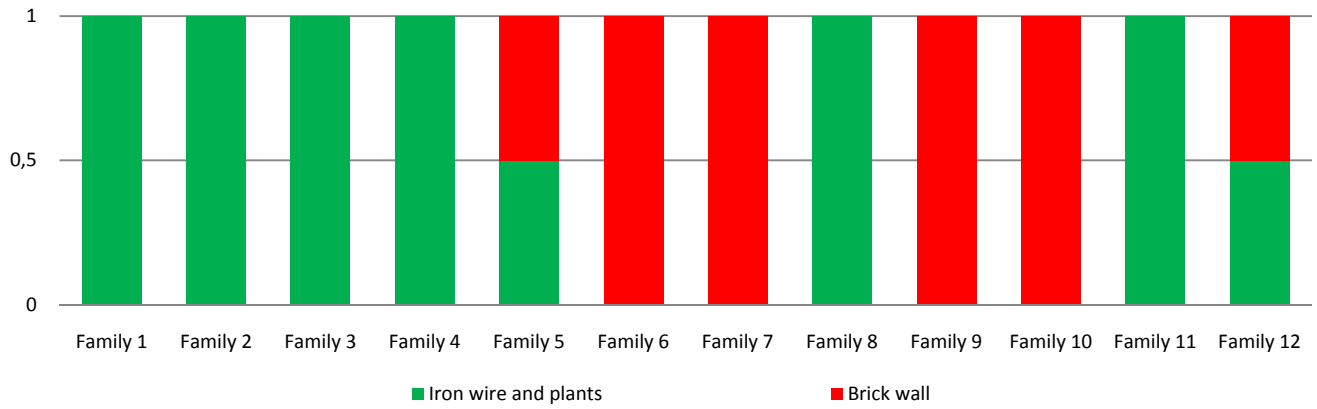


Fig. 3.16 Parcel boundaries



Fig. 3.17 constructed brick house in Santa Cruz de la Sierra.

Floor

In a research done by CidCruz, 36% of the 1746 rooms investigated had a cement floor, 31% of the spaces were covered with earth, 26% of the rooms had brick floors and only 9% of the spaces were covered with ceramic floor tiles. A preference for cement floors was also found in the twelve in-depth interviews conducted for this thesis; ten out of the twelve families had cement floors. The preference of a cement floor is related to the climatic conditions. Preferably, the floors are 20 to 30 centimetres above ground level to prevent water from entering during tropical rains. Besides, cement floors are relative cheap and keep the moisture level inside the house low. If it is possible financially, many people would like to finish their floors with ceramic floor tiles.

Wall

Traditionally, the Cruzeños constructed with small bamboo stalks and loam or adobe stones. You can still find these constructions in the old city centre and in the rural areas. Currently, clay bricks or ceramic bricks are much more common wall materials. Sometimes the walls are plastered to protect them from soaking by rain water. Also in the research of CidCruz, 72% of the walls were found to be constructed of bricks, 13% of the constructions, mainly the kitchens and bathrooms, were constructed out of wood. People rarely constructed with loam, sheet of corrugated iron, cardboard or plastic cloths; only one of the twelve families interviewed used these materials. All the other families constructed with bricks. All windows frames were made of wood, not all windows had glass; they were mostly covered with textile or fine meshed nets to keep the mosquitoes out.

Roof

The most important element of a house in a semi-tropical country is the roof. Preferably, the houses have a Spanish colonial tiled roof laid in cement and supported by a wood structure. Traditionally, roofs were covered with palm tree leaves, but nowadays it is expensive and only used for luxury housing. Asbestos cement plates are often used as a cheaper solution, but the asbestos fibres are unhealthy. Many migrants from the high lands use sheets of corrugated iron, which is also a cheaper solution. Unfortunately, the iron heats up by the sun and functions like an oven instead of sun protection. In the research of CidCruz, 41% of the researched roofs were made of sheets of corrugated iron, while 27% of the roofs were made of asbestos cement plates. Only 10% of the roofs were made of Spanish colonial roof tiles. Interestingly, a large amount of the toilets didn't have a roof. In the in-depth interviews some combined the roof materials. The Spanish colonial roof tiles or asbestos cement plates were placed on top of the enclosed spaces and sheets of corrugated iron covered the galleries.

Parcel boundary

In big cities, the construction of the parcel boundary is very important. Preferably, the walls are made of clay bricks which provide protection against burglars and youth bands. The investment required for a brick wall is large so most families have a border with plants and iron wire. Some families have partly walled boundaries, because their neighbour constructed it. But all families preferred a brick wall in the end.

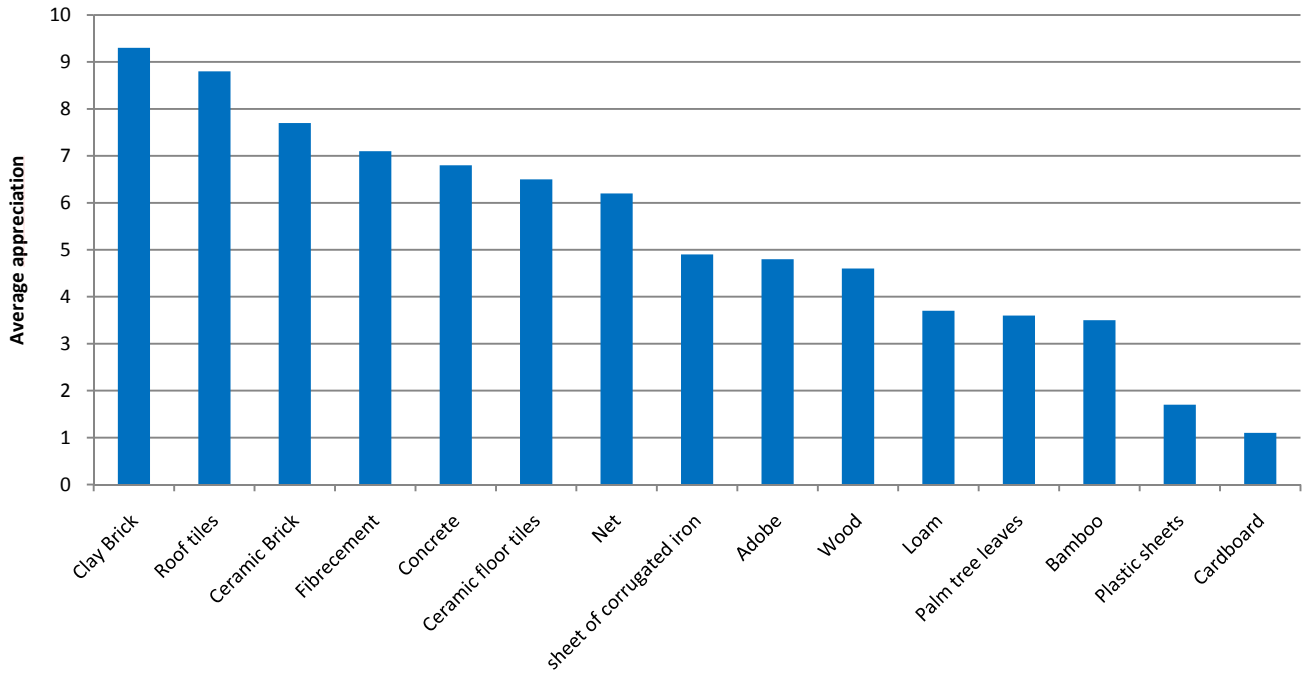


Fig. 3.18 Average appreciation of materials

Material Preferences

Not only was the current way of constructing questioned, but also their preferences in building materials. The clay brick as wall material got the highest score for appreciation followed by ceramic bricks. In the interviews some said the ceramic brick is cheaper, but breaks up easier and soaks up more water. A woman I interviewed spoke really positive about her mother's house in a rural area, constructed out of loam walls. Unfortunately, she lives in the city, where loam is not considered a building material. Loam or adobe can wash away during the rainy season, and does not have the robustness that bricks have. Besides, loam has a rural image.

As roof material the colonial roof tile is preferable, but expensive. In contrast to the bricks, the colonial roof tile has two cheaper alternatives; the asbestos cement plates and the sheets of corrugated iron. The asbestos cement plates technically are a good alternative, but most people do not seem to be aware of the negative health aspects. One of the elements in asbestos cement plates is asbestos, which is known to have toxicity and can cause lung cancer. The sheets of corrugated iron are also often used as alternative roofing material, but due to the climate are often not suitable.

Not many people know about the possibilities of constructing with concrete. Most of them use cement for flooring and foundations. One family made a supporting construction for the window openings, but more advanced applications were not found. Having a ceramic floor does not have the main priority, but is the dreamboat floor. Finally, an important material was a fine-meshed net in front of the windows and doors to keep the mosquitoes out of the house. The plastics and cardboard materials were not perceived as appropriate building materials. Remarkably, bamboo was not known as building material at all.



Fig. 3.19 Nine of the twelve interviewed families
41

3.3 Conclusions

From the research done by fundacion PAP one can conclude that the inhabitants of the poorer districts develop small economical activities that are important for improving their standards of living. The number of people that are capable of developing these activities is low, and therefore the economical capacities of these districts are low. The twelve interviewed families preferred an economic activity within their own parcels, but for many families this is still a dream. Developing a productive house; a house that facilitates, besides living, an economic activity, like a shop, a workshop, or cultivating of plants for sale, would be a great asset. Additionally, small scale development is stimulated by offering an economic facility.

The quality of living does not only depend on the financial possibilities, but also on the level of consolidation of the neighbourhood. The families depend on the facilities the local governments or private organisations provide in their neighbourhood. Education, health care and safety are facilities that are important for the quality of life. The local inhabitants should be involved in the development of neighbourhood functions, which results in better neighbourhood relations and better maintenance of neighbourhood areas. Although it is not proven statistically, it seemed to stimulate the consolidation process of a neighbourhood.

Next to neighbourhood facilities, the families depend on the cooperation's that provide services like drinking water, electricity, garbage collection and waste water collection. From the research of fundacion PAP as well as from the twelve in-depth interviews it became clear that most families have drinking water, electricity and garbage collection. Unfortunately, a sewage system is not present and most people just dump their waste water, which then penetrates the earth and mingles with the groundwater. The polluted ground water is used as drinking water, causing diseases. Therefore, a good and sustainable solution is necessary.

The houses constructed by the lower income groups develop gradually and the quality of these constructions varies a lot. When durable materials are used for the constructions, like bricks and roof tiles, an expert is hired for constructing. The expert mostly is a relative, friend or neighbour who knows how to lay bricks or construct a tiled roof. The temporal constructions made out of wood, sheet of corrugated iron, plastic sheets and adobe are self-built. The durable materials also have a higher cultural acceptance as shown in Fig. 3.18.

When designing a house one should look at the cultural acceptance of the proposed building materials. The design of the house could be a mix between self construction and the work of an expert, depending on the durability of the material. The self-construction parts of the house should be portable and applicable by unskilled people. Because of the self construction, the families will have a better knowledge of the construction of their houses, so reparations and improvements can be done easily by themselves. Their houses should be extendable according to their needs, desires and financial possibilities. The house should be adaptable to extensions, which already should be visible in the proposed design of the house. Proposing a design with already clear possibilities for future extensions will result in a higher quality product.



Fig. 4.1 A street in district 8



Fig. 4.2 Inundated street in district 8



Fig. 4.3 Social Housing by previous government for lower income groups

4 Existing Housing Solutions

After explaining the urban extension process in Latin America and the quality of living of the urban poor in Santa Cruz de la Sierra, the current housing solutions for the urban poor will be described. Which governmental, non-governmental, commercial and private organisations try to improve the quality of housing of the urban poor in Santa Cruz? Do they reach this group of people? What are the lessons we can learn from them?

4.1 Governmental programs

The government of the different Latin American countries have housing policies, ranging from free market policies to structuralism policies. The free market policy sees the housing problem as a result of disequilibrium between supply and demand. The solution was seen as the building of the largest number of units possible through the activities of the organized private sector. Unfortunately, the companies operating in this sector tended to maximize their profits by manipulating the land market and decreasing the use of skilled labour, causing extreme rise of the house prices thereby making these houses inaccessible for the low income groups. The structuralism policy relates the housing problem to the rather low rate development and sees it as a socio-economic problem. The structuralism way of dealing with the problem is stimulating economic development and proposing housing solutions that are related to available resources. The subsidization of cheap housing and semi-urbanized plots is understood to be a form of income redistribution. (6)

The Bolivian government has a mixed tactic between the structuralism and socio-economic policy. In 2006 president Evo Morales presented a governmental plan for the development of Bolivia, including the subject housing. Bolivia has a housing shortage of 298.000 houses while 855.000 houses are in bad condition. Additionally, the ownership of the land is a big problem. The proposed social housing program consists of a land register office in every municipality which will formalize the land sale and will stimulate small businesses by micro credits and a financing mechanism which can be applied for by the public and private sector with a quantitative or qualitative housing proposal. (23). On 14th of April 2007 the government of Evo Morales initiated the national program for social en solitary housing and the first of May the central land register office for productive development was officially opened. (24)

With the social housing program the government wants to establish access to good housing for all, especially for the population with low incomes. Additionally, the construction of houses will generate jobs. The housing program is a financial aid to realise housing and is divided in the qualitative and quantitative housing program. The qualitative program is split into 3 subprograms: The healthy house program provides extensions or improvements for sanitation and hygiene. The productive house finances the extending of the house with a room for financial activities. The house improvement program will support the improvement or extension of the current house to improve the live conditions of the family. The quantitative program provides new housing for the low and lower income groups in rural, periphery and urban areas. This program is split into 4 sub-programs providing mortgages without interest: one covering the rural housing deficit and the other three dealing with the urban housing shortage. Subprogram two provides mortgages for houses between the 2500\$ and 5000\$ serving the periphery low income groups. Subprogram three serves the periphery lower income groups with houses between the 5000\$ and 8000\$. Subprogram four is for the central urban lower income groups with house prices between the 8000\$ and 15000\$. (24)



Fig. 4.4 Participants of CidCruz's program constructing a kitchen



Fig. 4.5 Participants of CidCruz's program constructing a bathroom



Fig. 4.6 Houses of Habitat por la humanidad in the outskirts of Santa Cruz de la Sierra

4.2 Non Governmental Organizations

In Santa Cruz, there are at least four non-governmental organisations active in the field of quality improvement of low income groups: CidCruz, Habitat por la Humanidad, Fundacion PAP and Cedure. Each of the organisations and their way to deal with housing the poor will be described.

CidCruz

CidCruz is a centre of research and documentation in Santa Cruz. CidCruz performs research in the development of people in the poorer districts of Santa Cruz, socially as well as economically. Currently, CidCruz works together with the 200 families living in the district 8, to construct bathrooms, kitchens and rooms. CidCruz selected the 200 neediest families through workshops and research.

Among the selected families a research was performed to find out what the most essential facility was for a family: a bathroom, a kitchen or a room. Together with the family, an architect drew a plan where the new construction should be placed. Every family supported the project with two family members who helped constructing. Five families living close to each other formed a team and in 2 - 3 month they constructed 5 spaces with a bathroom, a kitchen or a room. CidCruz provided them the materials and education in constructing.

Most participants already lived 12-15 years on the parcel and rented a room for at least 10 years. The participants where really happy with the help CidCruz gave them. Can you imagine living for 12 years on 300m² and still not able to construct a decent kitchen, bathroom or living room?

Habitat por la humanidad

Habitat for humanity is a global organisation which has a local office in Santa Cruz. In Santa Cruz Habitat for Humanity constructs houses for small scaled communities around Santa Cruz. They have one project on the outskirts of the city Santa Cruz. The houses they provide are partly self constructed and partly done by bricklayers. They use the preferable building materials, fired bricks and ceramic roof tiles for the construction. The design is simple and provides some possibilities for extensions. The house costs around 4500\$ and with a micro credit the participants pay off the houses in 8 years. Unfortunately, the houses are not developed on a community scale and the houses don't provide space for economical development. As you can see in Fig. 4.6 they offer one individual solution for all future inhabitants, but no communal solution that defines a border between private and public areas.

Fundacion PAP

Between 1998 and 2002 cooperation between the Netherlands and the Bolivian government was initiated to work on the development of the poorer urban areas in different municipalities in Bolivia. In Santa Cruz this resulted in a foundation for citizen participation and fight against poverty, called "Fundacion PAP". This foundation is active on a neighbourhood level. Fundacion PAP tries to construct, together with the local inhabitants, a united society with respect, equality between men and women, active participation, social control and improvement of the lives of the poor people. They try to reach their goals by arranging tertiary education, promoting the people's rights and showing how the poor can reach institutions that can help them. Fundacion PAP also constructs police posts for more security and supports the construction of youth centres and sport clubs to prevent young people from becoming aggressive.



Fig. 4.7 Result of Cedure's "formación ciudadana" program left before and right after the contest



Fig. 4.8 Bottle house 1



Fig. 4.9 Bottle house 2



Cedure

Cedure is a research organisation which researches the rural and urban development in the district of Santa Cruz. Cedure researches the topics habitat, human development, environment, participative urban planning and the social-cultural and psycho-social aspects of the cruceñal society in order to reach an equitable, efficient and sustainable urban and regional development. Their researches result in booklets and small movie to create more awareness under the richer population.

The results of the investigations are used in Cedure's program "formación ciudadana". One of the activities Cedure executes every year is a contest to improve a neighbourhood's public areas. The neighbours work together to improve and adorn their public areas. (See Fig. 4.7) Last year, more than hundred neighbourhoods joined the contest. The winners get a playground to improve their neighbourhood even more. Until now Cedure's focus is on urban level, not on housing level.

Casa de botellas

Ingrid Vaca Diez, the wife of a local factory owner, designed and constructed two houses out of plastic and glass bottles. The first house cost her 18.000\$ and the second one 10.000\$. Vaca Diez got the money for the constructions from friends who support her ideas. The receiving families did not have a say in the houses she designs, but have to participate in the construction. This way of constructing can help a few families, but not tackle the main housing problem. Additionally the sustainability of constructing with bottles can be questioned. (See Fig. 4.8 Fig. 4.9)

4.3 Co-operative's and Banks

Most of the people with a low income do not have a regular, formal income. Only some banks accept informal income if it is well registered and official papers of parcel ownership are available which, for most low income groups, is not the case. Additionally, the interest rates are quite high, in general between 12 and 18%, which makes getting a loan even less attractive and achievable.

El buen Samaritano is a financial co-operative society who supports social housing with micro-credits. Together with an engineering office in urban planning, architecture and the execution of projects they construct neighbourhoods for the lower income groups. Unfortunately, their plans are still too expensive for the lower income groups. In Santa Cruz the commercial approach remains a difficult road for social housing.

4.4 Commercial programs

Creditierras

Creditierras is an organisation that buys a big piece of land. Creditierras makes an urban plan and then let it be approved by the Plan Regulador. Creditierras then constructs all the facilities and start selling the parcels. On some of the parcels they make a simple house with two sleeping rooms, a kitchen, a living room and a bathroom. (See Fig. 4.10) For example, a house in the Urbanization San Diego, km17 to the north of Santa Cruz with a total parcel surface of 360m² and a house surface of 100m² costs 20.000\$. One can pay for it in monthly terms of 207\$ in 15 years, with a first pay off of 3000\$ with a total cost of 40.260\$. You can reach the place by minibus; there is a market, and some other facilities. The house has drinking water, electricity, telephone, but no sewage system. The same parcel without a house costs 7260\$.



Fig. 4.10 Basic home of Creditierras



Fig. 4.11 Mid-sized house of "el Nuevo Esperanza"

Nuevo Esperanza

Nuevo Esperanza is an organisation with a similar structure as Creditierras, but offers more luxury housing. A house in a gated community costs 25.900\$ with a parcel surface of 300m². A house outside of the gated community with a parcel surface of 360m² will cost 25.700\$ for a 3-roomed house (See Fig. 4.11) or 23.000\$ for a 2-roomed house. Clearly, no person with a low income can pay this amount.

The director of el Nuevo Esperanza, explained the difficulties of realising social houses in the commercial sector. The price of brick, cement and steel has increased enormously the past two years. Moreover, the wages of the skilled worker and the ground prices have also increased. The wages of the skilled worker increased because many well trained masons migrate to Spain to earn more money. For these reasons it is almost impossible to offer a 5000\$ house with parcel, although this is an acceptable price for 50 to 60% of Santa Cruz its population.

Terracor

Terracor offers parcels and houses like Creditierras and Nuevo Esperanza does, but also offers the mortgages. Their apartments situated in a gated community with swimming pool and other facilities costs 32.000\$ and their cheapest house is 10.000\$. Buying only a parcel in the south of the city costs 1800\$ with a surface of 360m². With a mortgage you can pay off this parcel in 10 years, 22\$ a month. So only buying a parcel is perhaps possible for the low income groups.

El Pahuichi srl

El Pahuichi only sells parcels with the basic facilities like drinking water, electricity and telephone. Their urban plan reserves space for neighbourhood facilities like a square, a market, a green area, a collage, sport facilities and police office. They describe six different categories of parcels as shown in Table 4.1.

Location	Surface (m ²)	Price	Initial payment	Price per month	Payment time
Directly to the highway	10*30=300	6000\$	Not possible	Not possible	Not possible
One street from the highway	10*30=300	4500\$	400\$	52\$	10 years
Directly on the main roads	10*30=300	3600\$	200\$	49\$	10 years
One street from the main road	10*30=300	3000\$	100\$	42\$	10 years
Directly related to one of the neighbourhood facilities	10*30=300	2400\$	50\$	34\$	10 years
Rest	10*30=300	1800\$	50\$	25\$	10 years

Table 4.1 Parcel prices of El Pahuichi srl

Urbanizaciones Cortez

Urbanizaciones Cortez is similar to El Pahuichi, but cheaper. Drinking water and electricity is offered and a space for neighbourhood facilities is reserved. Cortez does not make a difference in location within the neighbourhood, but there is some difference in the location of the neighbourhood and the level of consolidation in and around that neighbourhood. In April 2008 Cortez offered parcels in three different neighbourhoods. San Andres is a neighbourhood at the border of Santa Cruz and Cotoca, east of Santa Cruz, which is not inhabited yet. There is a water tower, but the area is still overgrown. A parcel of 360m² costs 1.260\$ and with a mortgage you can pay off the parcel in 8 years, at 21\$ a month. Santa Carla is a bit more consolidated area and a bit closer to the city



Fig. 4.12 Self constructed wooden house in Santa Cruz de la Sierra

centre. It is part of district 8. Here a parcel of 360m² costs 1.515\$, which you can pay off in 8 years, at 22,50\$ a month. The last neighbourhood is Cortez, named after the organisation, which is surrounded by already inhabited neighbourhoods and is the most consolidated area out of these three. A parcel of 360m² costs 2.784\$, which you can pay off in 15 years, at 30\$ a month.

In Santa Cruz there are many more commercial housing organisations present. They build for many different economic classes. The cheapest offer for housing found was at Crediterras, but it is not a reasonable offer for a lower income family. Cortez sells parcels for relatively low prices with surfaces between 300m²-360m². Most of their urbanizations are located far from the city centre, sometimes even outside the municipality borders. Most of the parcels do not have drinking water or electricity yet. The parcels are overgrown by plants and trees and sometimes roads are not there yet. When these areas are more habited a more urban image will appear, depending on private and neighbourhood initiatives. In fact, the private organisations only offer a cheap parcel for the lower income groups, but do not offer housing solutions.

4.5 Conclusion

Currently there seems to be no integral solution for social housing in Santa Cruz. The housing program of the government is quite extensive and shows that the government is aware of the problems with the housing situation of the lower and lowest income groups. Unfortunately they only offer a financial solution, but no plan of execution and construction of housing.

In the nongovernmental sector the solutions that are available, are on an individual scale. The solution of CidCruz is one of quality improvement, whereas the solution of Habitat for Humanity deals with producing more quantity housing with a high quality. Fundacion PAP and Cedure deal with the improvement of neighbourhood quality, but not with the housing solution. All four organisations deal with certain aspects that were found to be important in chapter 3, such as the improvement of neighbourhood facilities and the facilitation of aid in constructing. CidCruz its methodology to join forces during construction gave an added value to social interaction within the neighbourhood. Habitat for Humanity provides new houses with a good price-quality-space ratio. Fundacion PAP's way of improving urban live and Cedures way of making citizens proud with their neighbourhood are great examples of how to work on an urban level. It would be interesting to integrate these aspects into a single project.

Within the commercial sector, banks and financial cooperatives offer no real solution for lower income groups. As the director of Nuevo Esperanza explained, there is almost no possibility to build a house commercially for 5000\$. Organisations like Cortez can offer this group a parcel, but no house. The house stays an individual problem and no commercial organisation is able to or interested in searching for a solution.

In Santa Cruz, housing for the lower income groups is considered an individual problem, not a collective one. However, as CidCruz showed, joining forces will bring them more prosperity. Learning from the current housing solutions, the challenge is to design a basis unit that not does exceeds 5.000\$ using the social housing program of the government. The house should be extendable, but each extension should be cheaper than the basis unit.

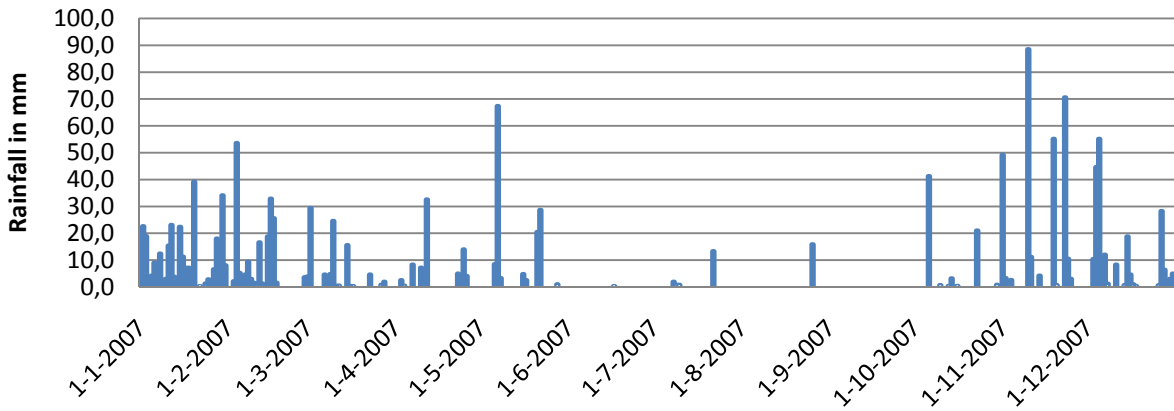


Fig. 5.1 Rainfall in Santa Cruz de la Sierra in 2007

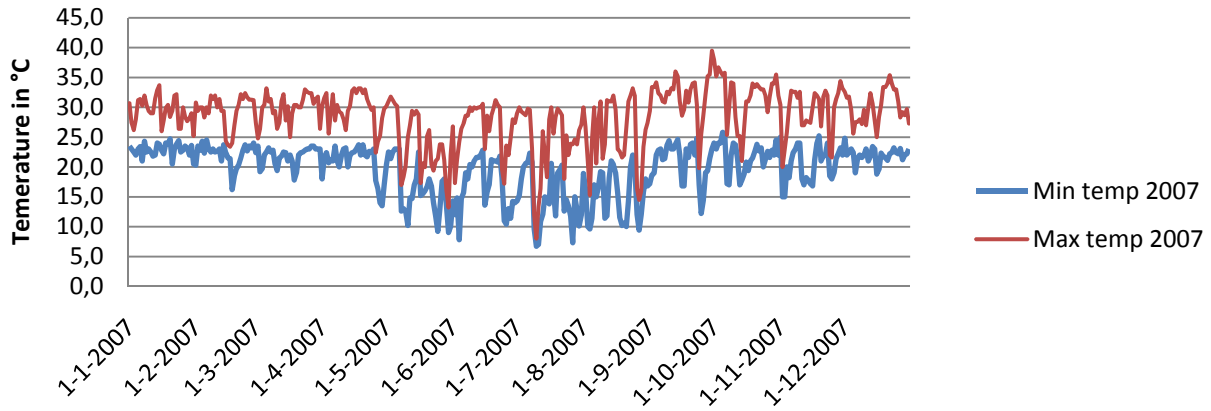


Fig. 5.2 Temperature in Santa Cruz de la Sierra in 2007

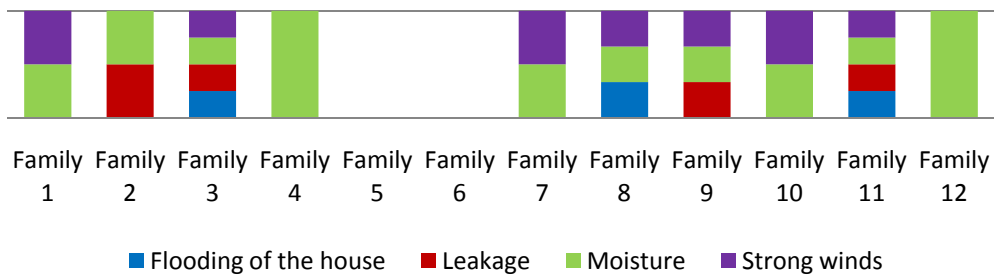


Fig. 5.3 Building physical problems

5 Local conditions

The financial and social situation, the available building materials and the cultural setting all influence the quality and appearance of a house. However, the main reason to construct a house is to protect against climatic influences. In this chapter the climate in Santa Cruz will be described together with the way it influences the construction of houses.

5.1 Climate

Santa Cruz has a semi-tropical climate with annual temperatures of around 21°C and a relative humidity of 69%. Cold wind patterns, called “surazos”, can blow occasionally from the Argentine pampas, making the temperature drop considerably. (See Fig. 5.2) January and February are months of great rainfall, but occasionally throughout the year tropic rainfalls surprise the cruceños. (See Fig. 5.1)

During my stay in Santa Cruz I experienced some extreme climate moments:

“I wake up with a stunning rainfall. To travel to my appointment that morning I had to take a taxi. I drove through an indescribable chaotic city. Some streets were submerged in 10cm of water. The rain water could not go anywhere. The taxi driver needed to use a napkin to keep the windows free from moisture. It looked more like sailing than driving through the streets.”

“Till last Sunday the temperature was around 35°C, but Monday the temperature suddenly dropped to 12°C, due to the Southern wind or “surazo”. During the following week the temperature turned back to normal.”

5.2 Impact on housing

Many people living in the poorer districts come from the highlands or valleys. They bring their way of constructing with them, but this does not offer them any protection in this different ecological environment. Since the climate in Santa Cruz is hot, humid and rainy, the materials these people use are not suitable and the houses they build quickly get ruined, and become uninhabitable. (1)

In the twelve in-depth interviews the families were asked which problems occurred due to climatic impact. Ten of the twelve families had moisture problems within their houses. Especially after tropical rains combined with a high humidity, their walls stayed wet, the floors humid and their cloths in the closets became clammy. If there was no sufficient ventilation the absorbed rainwater in the floors and walls caused mildew. Four of the twelve families interviewed had leakage problems with the roof; especially flat roofs were sensitive to leakage in this climate.

Three out of the twelve families had their houses flooded during the rainy season. It seems that many houses in the poorer neighbourhoods of Santa Cruz remain flooded for a couple of days or sometimes weeks in the rainy season. The people have nowhere else to go, so are used to living with a couple of centimetres of water in their houses.

Not only the rain and moisture, but also the southern wind causes problems. Seven out of the twelve families are bothered by the dust that enters the house or have to repair their houses after the “Surazo” passes. During the period the southern wind blows, many people in Santa Cruz do not work. They lay in bed covered with blankets, because of the cold. The wind causes a lot of damages to the more precarious constructions, like lifting roofs and blowing down walls. Next to that, a lot of dust enters the houses, which mostly do not have any windows.

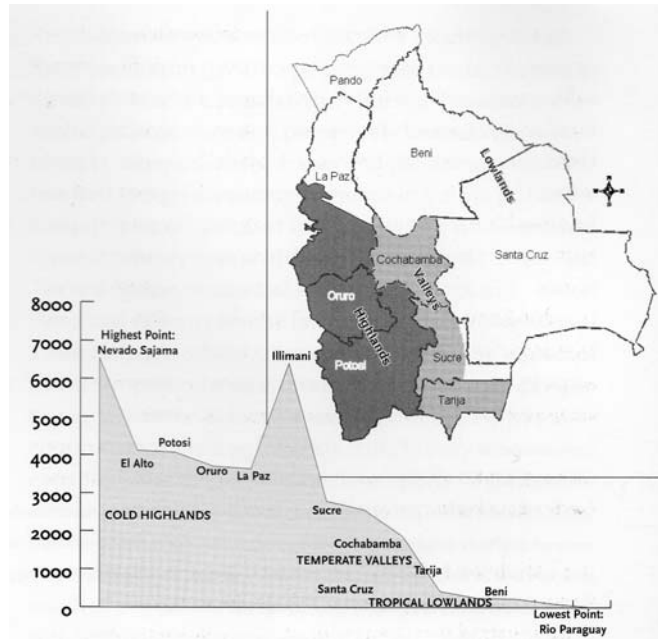


Fig. 5.4 Bolivia with altitude above sea level and location of the 3 climatically regions; highlands, valleys and lowlands



Fig. 5.5 climatically aspects that should be taken in account with a building design

5.3 Conclusion

The semi-tropical climate of Santa Cruz, with its heavy showers, a burning sun, and the southern winds which cause the temperature to drop with at least 10 degrees, influence the necessary building quality of the house. Also, the high humidity level can degrade the used building materials. The house serves as a protective shelter against the hostile climate. To create a comfortable house, the climate should be used in a beneficial way. For example, the north-west wind can avoid the development of mould, and the sun can help heat up water for showering or cooking. Sun-light heats up the house and preferably should be barred out, but the sunlight also helps the drying of materials after a heavy rain.

SHF CATCH Method, Comprehensive Approach To Community Based Habitat

	1	2	3	4	5
<i>The capacity for executing building activities</i>	<ul style="list-style-type: none"> • Able to express family housing needs • Able to distinguish different quality levels of building materials • Able to assist in simple construction tasks 	<ul style="list-style-type: none"> • Able to identify and express community housing and infrastructure needs • Able to recognize and value construction materials characteristics • Able to do supervised skilled construction work • Able to understand technical construction decisions 	<ul style="list-style-type: none"> • Able to read technical designs • Able to do skilled construction work independently • Able to understand construction theory 	<ul style="list-style-type: none"> • Able to assist other communities implementing habitat programs • Able to translate technical designs into construction procedures • Able to facilitate other skilled construction workers • Able to supervise construction works • qualified for multiple technical skill sets • Able to coach others in obtaining building skills 	<ul style="list-style-type: none"> • Able to implement habitat programs independently • Able to run construction related businesses • Able to implement and execute long term maintenance • Able to research new construction methods and use of materials • Able to design buildings and infrastructure • Able to understand urban and rural planning

Table 6.1 Part of the CATCH Method, complete method can be found in Appendix B

6 Sustainable constructing

This chapter will deal with the sustainability subject. In the previous chapters the local gathered information was discussed to obtain bottom-up design criteria. Additionally, some top down design criteria are added based on sustainability. Sustainable development, a global issue, is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations. The sustainability aspects are also important to take into account in a local housing design for the low income groups in semi-tropical zones. In the first paragraph we will look into the social sustainability. How can the lower income groups be better involved in the development of housing and in which way can housing give a positive result to social sustainable development? Topics such as climate change, CO₂ reduction and environmental quality are high on many political agendas. In the second paragraph the influence of construction on the environment will be treated. In paragraph three the profit topic will be discussed, with a focus on local development of an economy. In the last paragraph conclusions will be drawn.

6.1 People

The will to improve the lives of the poor in a sustainable way is the reason for the “West” to develop social housing programs. The improvement of lives does not only happen by realizing better homes, but can also be a part of life improvement of the urban poor. When sustainable development is proposed, most people think about environmental friendliness and durability. However, when a house is not culturally accepted and does not fit in the social interaction of that culture, the house will not be used or valued. Therefore, it is of great importance to develop a house together with the local inhabitants; interaction and participation of the urban poor in the building process is necessary. This way, developing houses does not only have a technological approach, but also a social one.

In chapter four we saw different examples of social housing in Santa Cruz. Habitat for Humanity and CidCruz are probably the best examples of working together with the target group. By means of education, the necessary skills are learned and rewarded with a certificate. The quality of the end result was mainly depending on the interaction with the local people who will live in the houses.

Solid House Foundation also realises an active relation with the future owners of the houses. The houses they realise are constructed by the community, called Community Based Development. Community Based Development makes use of the strengths that already exists within communities as a means for sustainable development. For example, when constructing houses of brick, the bricklayers within the community can form an already existing knowledge pool. By joining forces, the community discovers their ability to develop their own lives without help from outside. Solid House Foundation developed a method to analyse and develop the community, which they called the CATCH method, see Table 6.1. This method shows how the construction of housing can be implemented in a social context.

For Santa Cruz, Community Based Development implicates a big shift. Nowadays, the housing solution of the urban poor is an individual problem, not a communal one. For implementing such a project, an already existing community is necessary. Preferably, the community is an already existing neighbourhood so the community based process can also be reflected in the design of the streets and the neighbourhoods. In this way, not only a house is

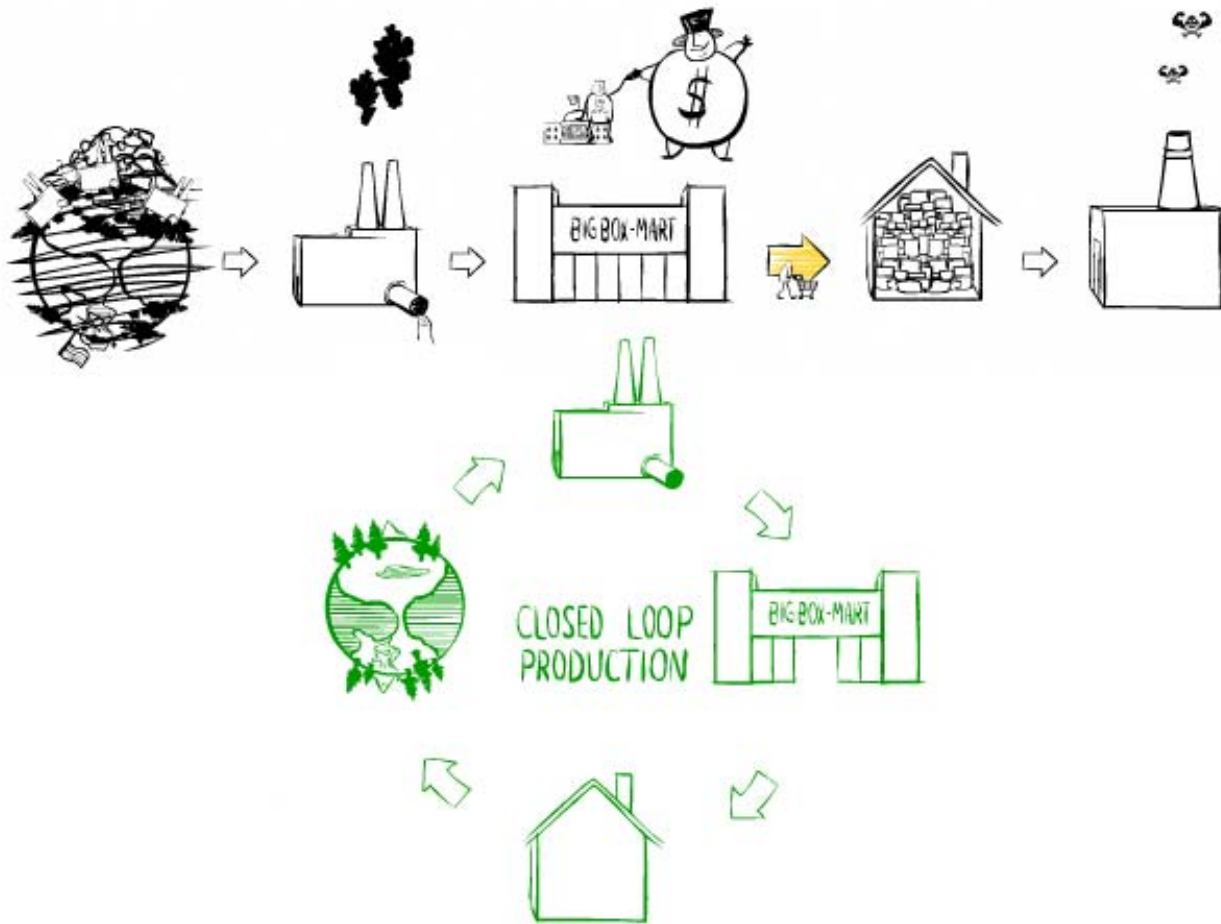


Fig. 6.1 From linear product process to a life cycle product process (25)

realised, but also a community. By constructing the houses a social coherence should become bigger. The method of mobilising a community should be reflected in the design to improve a better end result.

6.2 Planet

When constructing houses we should not only look at the cultural background, but also at the environmental impact of materials and construction on its surrounding. In the sustainability of materials theory Cradle to Cradle (26), materials are divided into two cycles: the biological and technical cycle. The bio-degradable materials are part of the biological cycle. These materials can be used for human purposes and afterwards brought back into nature, which will feed the biological processes. The technical cycle is inspired by the biological cycle, but the synthetic and mineral materials are part of this cycle. These materials are part of a closed cycle from production till reproduction and will keep the same value during many lifecycles. (See Fig. 6.1) Not only the production process, but also the waste produced during the production process should be taken into account. Currently, the production of building products are not produces with a life cycle process, but analyses can be made to choose the most sustainable materials available.

Next to material choice, the management of water, energy and waste water should also be analysed on sustainability. The current way of waste water management is not very sustainable, as described in chapter 3.1. A decentralised local system could be proposed or a central neighbourhood system with a bio-gas installation, which can provide the neighbouring families with gas for cooking. The water supply is quite well organised in Santa Cruz and, because of the tropical climate, it is not of big concern. However, the quality can be improved by better waste water management.

Energy supply in Santa Cruz is centralized. The introduction of solar energy could be attractive, because a lot of sun power is available. Unfortunately this technique is still quite expensive and requires higher educated technicians to maintain the system. However, one should take into account that in the future solar power systems can become a suitable way for energy production. The infrastructural facilities like water, electricity and waste water management are more relevant to deal with in the design on neighbourhood scale than on an individual housing scale.

6.3 Prosperity

The goal of building sustainable houses is to provide prosperity for the low income groups. In the context of designing and constructing houses two aspects can be defined. In first place, space for economical activities can be provided together with the house. Therefore, the poorer families will not only own their own house, but also have space to develop economical activities. Secondly, with constructing the houses the people can develop new skills or building products. The new skills can result in new paid labour in the building industry. With the production of new building materials small factories can be founded.

The houses that will be constructed have to be affordable. The provision of opportunities to develop economical activities will create the possibility to pay back a micro credit. As is concluded in chapter 4.5, the houses should not cost more than 5000\$. In this way a sustainable proposal should be realisable.

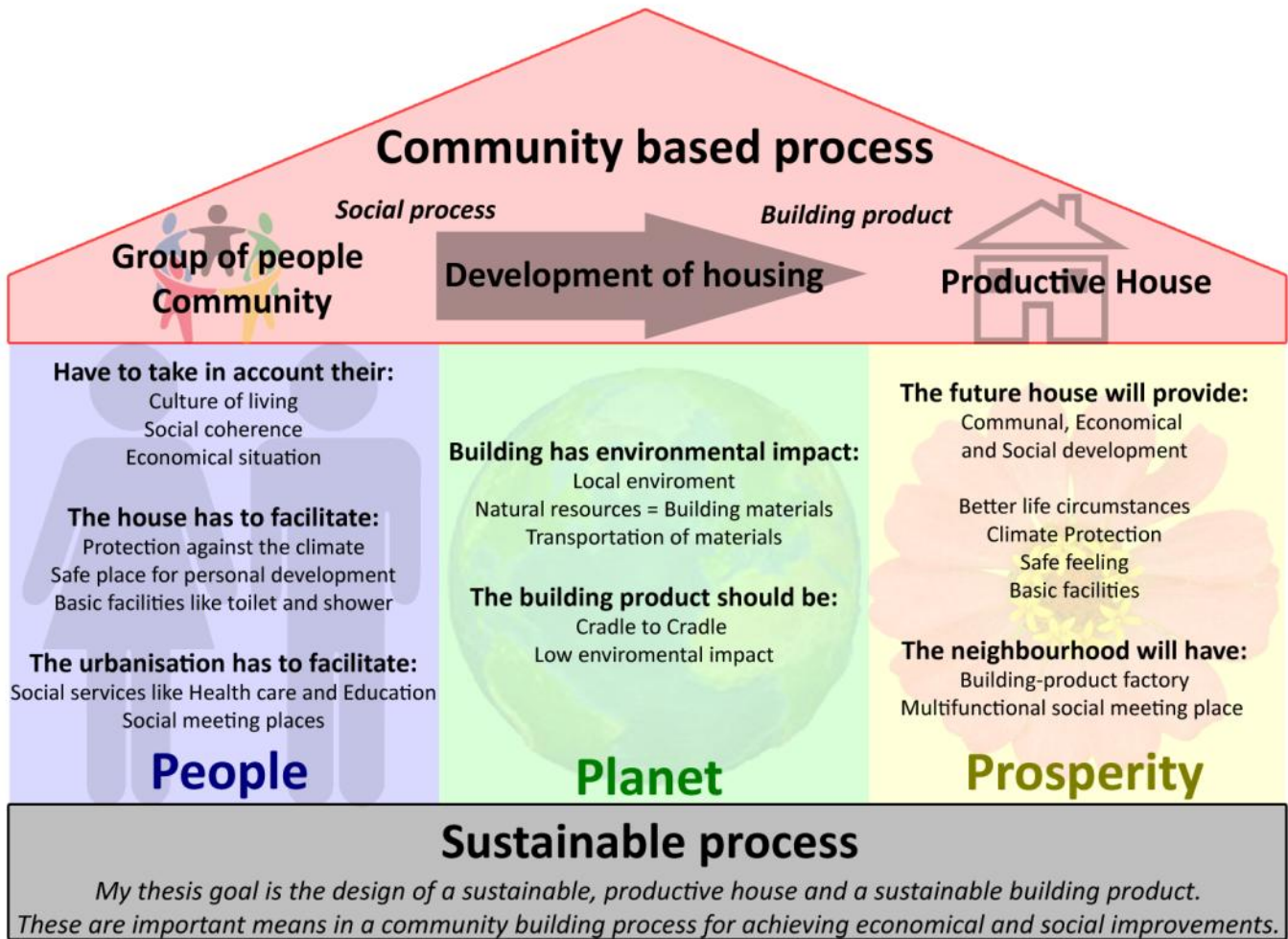


Fig. 6.2 Conclusion scheme of sustainable construction

6.4 Conclusion

In Fig. 6.2 a visual conclusion of this chapter is drawn. When developing a lower income group by housing in a sustainable way one should look at the target group, the environment and the prosperity one wants to reach. The design of the houses will be influenced by the community based process through the method of construction, the (multiple) usage of the spaces in and around the house including the facilitation of economical activities and the relation of the house to the street and its neighbours.

The development of the community should also be visible in the lay-out of the neighbourhood. One house can be individual, but when the houses in the street are connected or related to each other a street with facades appears. The community will receive space to live like a community and life will take place on the border between private areas and public space.

In Santa Cruz housing for the lower income group is considered an individual problem, not a collective one. By developing the neighbourhood as a community the people will learn that joining their forces will bring them more prosperity. Depending on the level of development of the community, a certain amount of education can be necessary to reach the level to construct qualitatively good houses. In the design, the community development approach can be reflected by, for example, the development of new building products that will result in small factories. Also, the community can be taught to use new building techniques so new types of employment appear. Therefore, the end result will not only be a good house, but also the potential for economical development.

When choosing the construction materials, one should not only look at the building product its first destination, in the form of becoming part of a building, but thought should be given to possible usage or biodegradability after the use as a building material. The production of materials, the transportation of materials, and the application of materials into a building produces waste materials and pollutes the environment. Therefore, minimal pollution by the building materials should be important in the design decisions. Finally, one should also look into more sustainable solutions, current solutions as well as possible future solutions, for infrastructural facilities such as water distribution, water waste management and the generation of electricity.

7 Conclusion & Design Criteria

From the bottom-up and top-down analysis made in the previous chapters a list of design criteria (27) for a house for the lower income group in semi-tropical zones in Latin America is developed. This list will also function as a checklist during, and at the end of, the design process.

Spatial criteria:

Constructability	Most houses in poorer neighbourhoods are self-built. The quality of these constructions varies a lot. By offering a self-constructible house with already designed possible future extensions, a higher quality product can be realised. Because the families with lower incomes realise their houses themselves, reparations and improvements can be done easily.
Extendibility	In general, the lower income groups do not have a fixed income. Therefore, their houses should be extendable according to their needs, desires and financial possibilities. The different possible phases should be visible in the proposed design of the house, vertically as well as horizontally.
Sustainable water use	Concluding from the in-depth interviews, all families had showers, toilets, kitchens and washing facilities. The waste water is not collected, but penetrates the earth and mingles with the groundwater. The polluted ground water is used as drinking water, causing diseases. Therefore, a good and sustainable solution is necessary.
Facilitate economic activities	The twelve interviewed families preferred an economic activity within their own parcels, but for many families this is still a dream. In addition, the local nongovernmental organisations, real estate agents, financial organisations and architects seemed to be very enthusiastic and positive about developing a productive house; a house that facilitates, besides living, an economic activity, like a shop, a workshop, or the cultivating of plants for sale. By offering an economic facility, small scale development is stimulated. For example, a small factory producing building products can be introduced.
Community based development	In Santa Cruz housing for the lower income group is considered an individual problem, not a collective one. By developing the neighbourhood as a community the people will learn that joining their forces will bring them more prosperity. In the design, the community development approach can be reflected by the development of new building products that will result in a small factory or the education of the community in new building techniques so new types of employment appear. Therefore, the end result will not only be a good house, but also potentials for economical development.
Create neighbourhood relation	The development of the community should also be visible in the lay-out of the neighbourhood. One house can be individual, but when the houses in the street are connected or related to each other a street with facades appears. The community will receive space to live like a community and life will take place on the border between private areas and public space.

User perspective criteria:

User friendly

The construction materials used to build the house should be portable and applicable by manpower. The building product should be applicable by unskilled people.

Basic comfort

The semi-tropical climate, with heavy showers, very cold southern winds, and a burning sun, influence the necessary building quality of the house. Besides, the high humidity level can downgrade the used building materials. The house serves as a protective shelter against the hostile climate. To create a comfortable house, the climate should be used in a positive way. For example, the north-west wind can avoid the development of mould, and the sun can help heat up water for showering or cooking. Sun light heats up the house and preferably should be barred out, but sun heat also helps the drying of materials after a heavy rain.

Low cost

The income of the low income group is not constant. Therefore, the minimal basis unit should not exceed \$5.000, - USD. Each extension should be affordable and cheaper than the basis unit.

Environmental criteria

Cradle to cradle

When considering a construction material, one should not only look at the first destination. In other words, the building product should become part of a building, but thought should be given to possible usage after the use as a building material.

Minimal pollution

The production of materials, the transportation of materials, the application of materials into a building produces waste materials and pollutes the environment. Minimal pollution by the building materials should be important in the design decisions.

Optimal use of materials

The traditional brick and the colonial roof tile are favourite building materials. The brick is still produced traditionally; by hand in a loam wood furnace. Taking the current expansion of the city into account, the demand of bricks will only continue to grow. A research into alternative building materials, that are culturally acceptable and sustainable, will be important. When choosing natural fibres and matrices, the Food, Fibre and Fuel discussion should be taken in to account.

Future value

The extendibility was already mentioned as an important future value. All systems introduced in the design need to be evaluated on their future value. An investment in durable applications should have a long life span, especially for the lower income groups. For example, if a sewage system is introduced in their neighbourhoods, the complete infrastructure has to be built. An autonomous waste water system could be introduced in the design with a future possibility of connecting it to the sewage system.

8 Recommendations

When writing this thesis about design criteria for lower income groups in Latin America two questions staid in my mind. *'Why should "the West" (including myself) help develop poor countries with social housing?'* and *'What potentials do lower income groups have to develop themselves?'* In this recommendation section an attempt is made to answer these questions for the situation in Santa Cruz. Next to this, some recommendations for Solid House Foundation and further research will be given.

Social-economical-political interaction

The social coherence of the population and historic background influences the "group spirit". The Latin American indigenous population have a long history with many traditions. The different tribes lived in different areas and the borders as we know them nowadays were unknown. Due to the colonization, many people from Europe migrated to Latin America, followed by the African and Asian slaves. The migration caused differentiation between the rich Europeans, the poor Latin Americans and the slaves from Africa and Asia. In the 19th century, Latin America formed republics, but the social structure remained unchanged. Multi-cultural societies like in Bolivia do not have one common history in which they believe, and will not construct their society together.

Secondly, the inhabitants are dependent on the political-economical model of their country. The level of social interference by the government depends on the provision of public and private facilities. For example, one of the liberal model principles is a reserved attitude towards governmental interference, while the social model supports a strong governmental interference to solve social problems. These political models influence the governmental spending spread. Next to this, the economical situation is also important. Not only the preference of spending, but also the amount of money available and the way the plans are executed are important for the low income groups.

More than the central government, the local governments can have influence on the quality of life of the local inhabitants. Mostly, the local governments depend on the responsibilities and financial support they get from the central government. The result of the planning and execution of projects, on the other hand, depends on the capabilities of local governments. In Bolivia, discussions between the central government and department officials are held about the responsibilities and financial distribution.

Local or global initiatives, commercial as well as non commercial, can provide further opportunities for the local low income groups. In Santa Cruz one can find the local organisations like CidCruz, fundacion PAP and Cedure who develop projects together with the local inhabitants to improve their lives. Also, more commercial initiatives can be found in Santa Cruz, like El Buen Samaritano or Urbanizaciones Cortez. On a global level, only Habitat for Humanity can be found in Santa Cruz. Maybe the liberal minded city fails to attract global attention?

Finally, the possible development of a low income group family also depends on their own attitude, financial possibilities and capability of seeing new developments. To which level do they want to participate with their own development and at which level they require help or actions from others. Education is very important, because it can help in supporting a certain attitude.

In the end, one can say it is all about the interaction between own initiative and the dependence on other parties. Up to which level do you need to give a helping hand, and what can the lower income groups do themselves? What are the expectations of the lower income groups, but also, what are your expectations? Should one have expectations when supporting or lending a hand?

As an architect you can provide a helping hand in visualizing one's own future physical context. You aid the translation of a vision into a realisation. This project will only reach the vision level. It will be buildable, but the question is whether it should be built. Personally, I think more interaction with the future inhabitants is needed to realise their context of living. This project, however, can function as an inspiration for housing development parties as well as lower income families.

Solid House Foundation

The CATCH method developed by Solid House Foundation gives many points of departure for a house design. Personally I am of the opinion that the current design, a concrete dome, does not provide the potential to reflect the community development on street and urban scale. Here lies a challenge for Solid House Foundation: To develop designs with a better implementation of the community into the designs. Community Based Development will then become even better implemented.

Future research

Developing design criteria can help to make easier design decisions and also give structure to local research and better understanding of the social, economical and ecological situation. Probably, more design criteria can be developed and every situation will have different design criteria. It could be interesting to research whether a global design questionnaire can be made and local answers can be found resulting in local design criteria.

Furthermore the developed design criteria should be tested by groups of architects and designers to verify and adjust the design criteria list. The criteria are also dependent on the development method. When using a different community development method, it could be that other design criteria are found.

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Appendix A visualisation of the 12 family interviews



Temporary shower and toilet.



On the left the old kitchen which is located behind the first construction. This kitchen is no longer in use, because of the large number of holes in the roof.

On the right the current kitchen, which will be used as bathroom in future.



Living room from inside

The uncovered brick structure is the second construction, which is still not finished. It contains a living room and a future bathroom which is used as kitchen nowadays.

Family 1

Original local family in a new neighbourhood
 Family members: 5
 Period of occupation: 6 years
 % Built-up area: 11,3



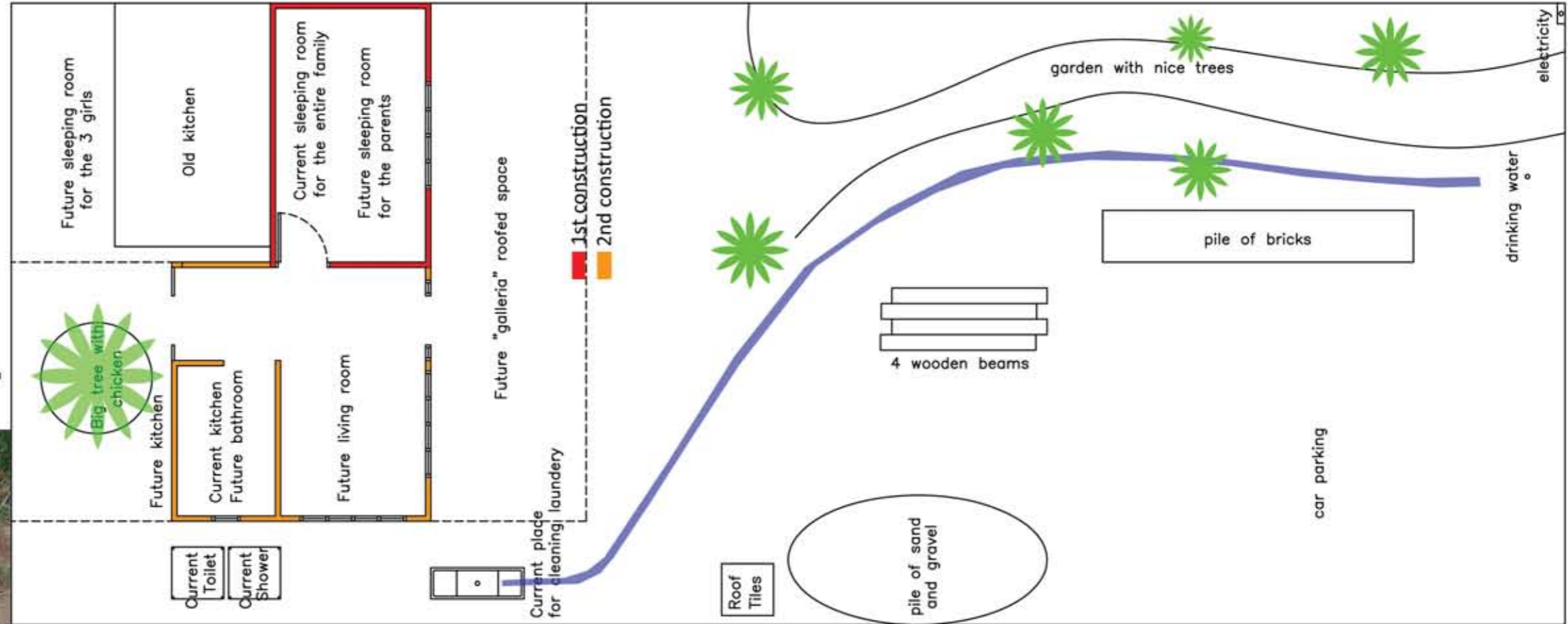
The white structure is the first construction, which was made directly with bricks and tiles and has a multifunctional usage.



Place for washing clothes. For the water to reach this place a garden hose is used.



The building materials which are already bought for future constructions.



Family 2

Migrant family in a new neighbourhood

Family members: 7

Period of occupation: 9 years

% Built up area: 21,2



The bathroom is still not finished, but it is already in use.

In front is the cleaning place for laundry



A picture taken from the entrance



The temporary construction made of wood, metalsheets and plastic. These materials once served as materials for the family's first construction.



The "galleria" with a cement floor.



Living room



One construction consisting of two rooms and a kitchen. In front of the rooms is a roofed space "galleria" is constructed to provide shadow.



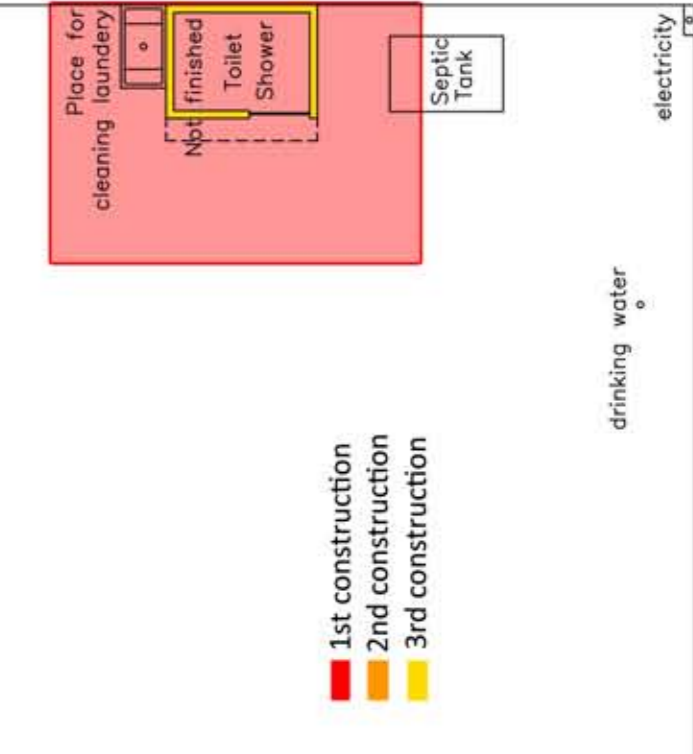
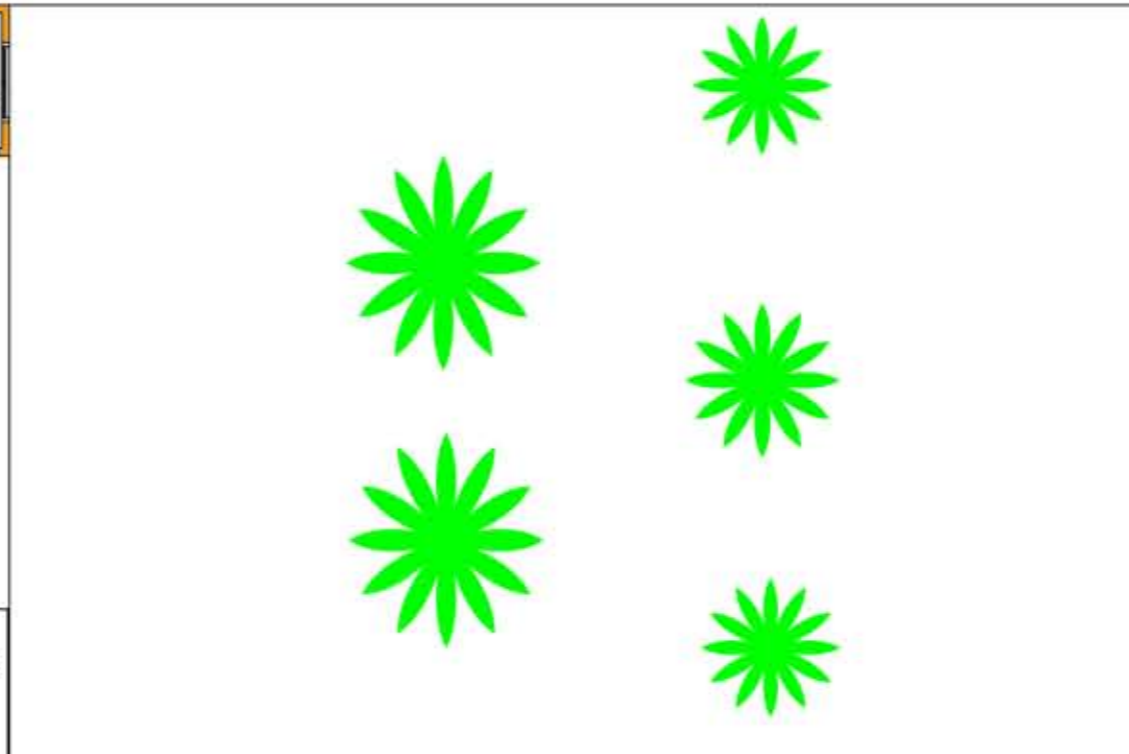
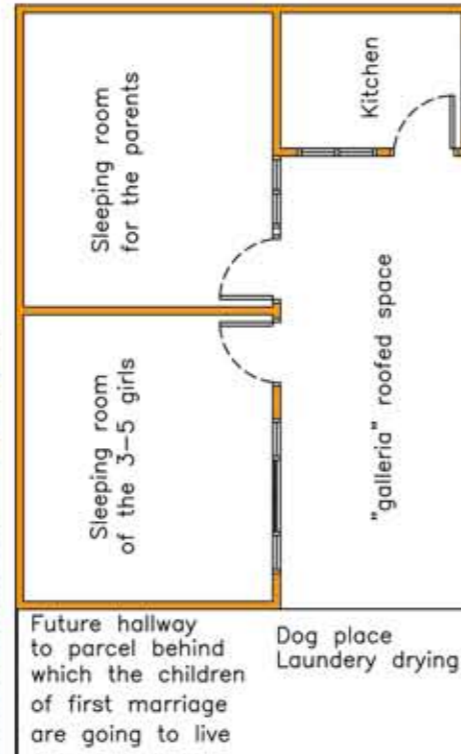
At the left, fibre cement plates which are used as roof material for the kitchen and steel plates are used as roof material for the "galleria".



The windows have no glass, because of a lack of funding.



The water tap



- 1st construction
- 2nd construction
- 3rd construction



Family 3

Migrant family in a new neighbourhood
Family members: 1
Period of occupation: 7 years
% Built up area: 7,8



The back facade. Exterior view



The back facade. Interior view



The interior of room 1



Interior of room 2.
Electricity comes from the neighbours, plywood, plastic and steel sheets



The flooded garden

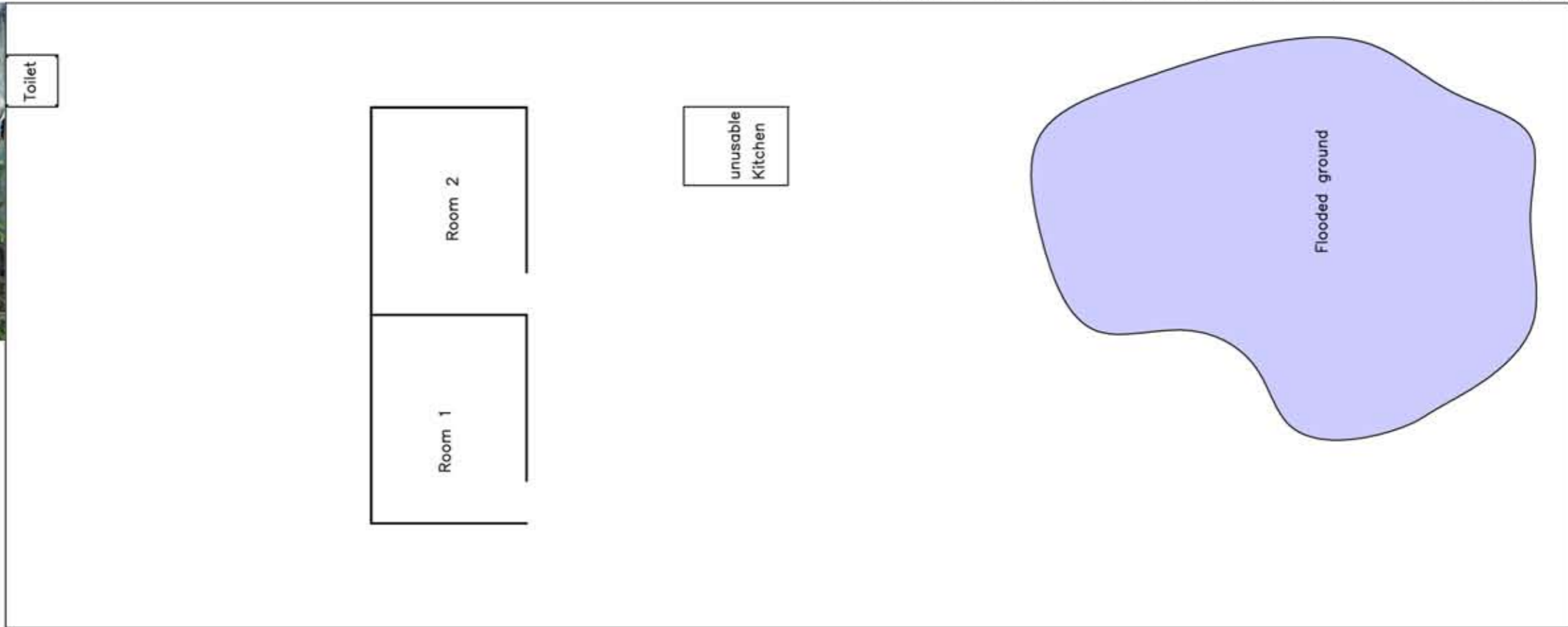


A fallen adobe wall



The toilet

The fallen kitchen, the owner gets food from his neighbour or buys it on the street.



Family 4

Migrant family in a new neighbourhood

Family members: 5

Period of occupation: 12 years

% Built up area: 15,0



The shower and toilet. A gift from an NGO



The second construction is still unfinished. In the back a plastic roofed space for recycled bottles



The first construction made with bricks and plaster. It has a multifunctional usage. Cooking takes also place here



Laundry place. At the left a disconnected wire from the electricity can be seen. The bicycle is from the father of the family



Outside living room



water tap

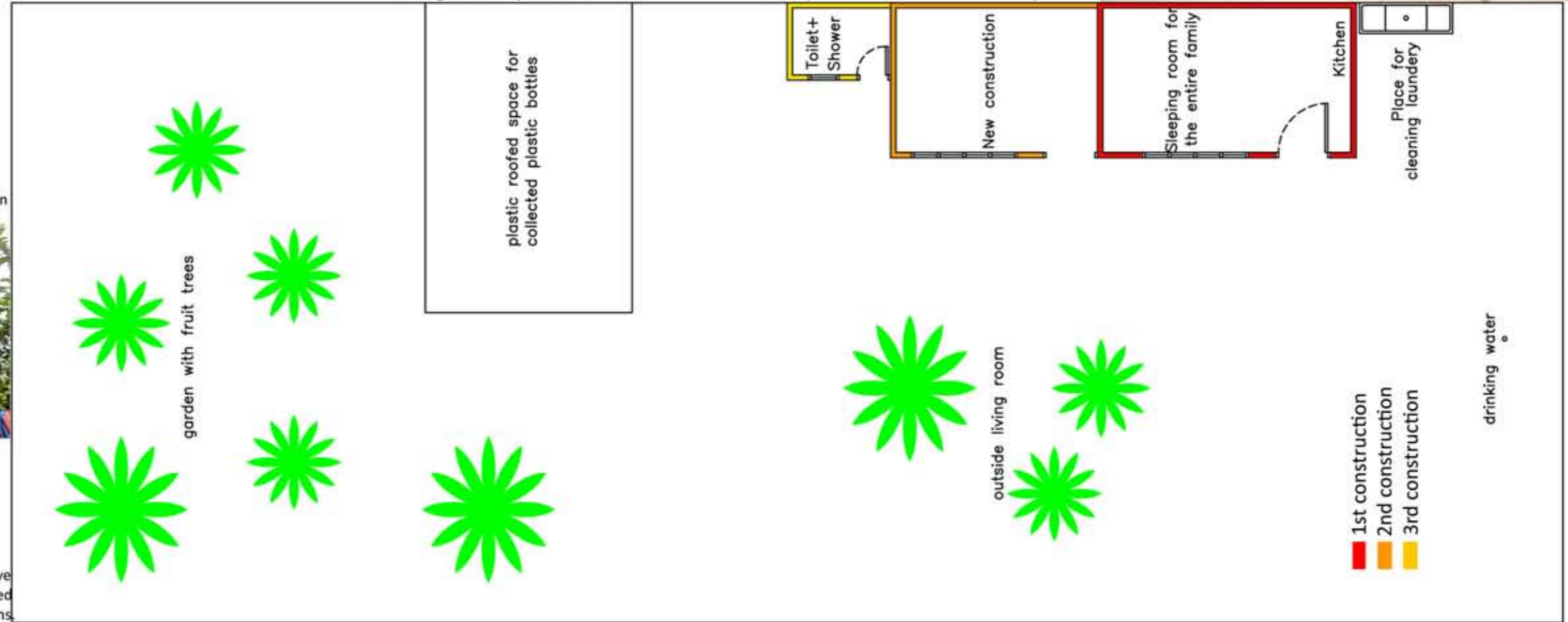
Natural products from own garden



garden with fruit trees



The materials that have already been purchased for future constructions





2nd construction made of bricks and metal roof sheets.
 First construction does not exist anymore



Kitchen, the third construction; on the same spot as where the first construction was.



A paved patio for neighbourhood reunions.



An altar



The newest construction for the son of the owner.



Three rooms, a bathroom and a "galleria" in front.



A water tap with a laundry spot

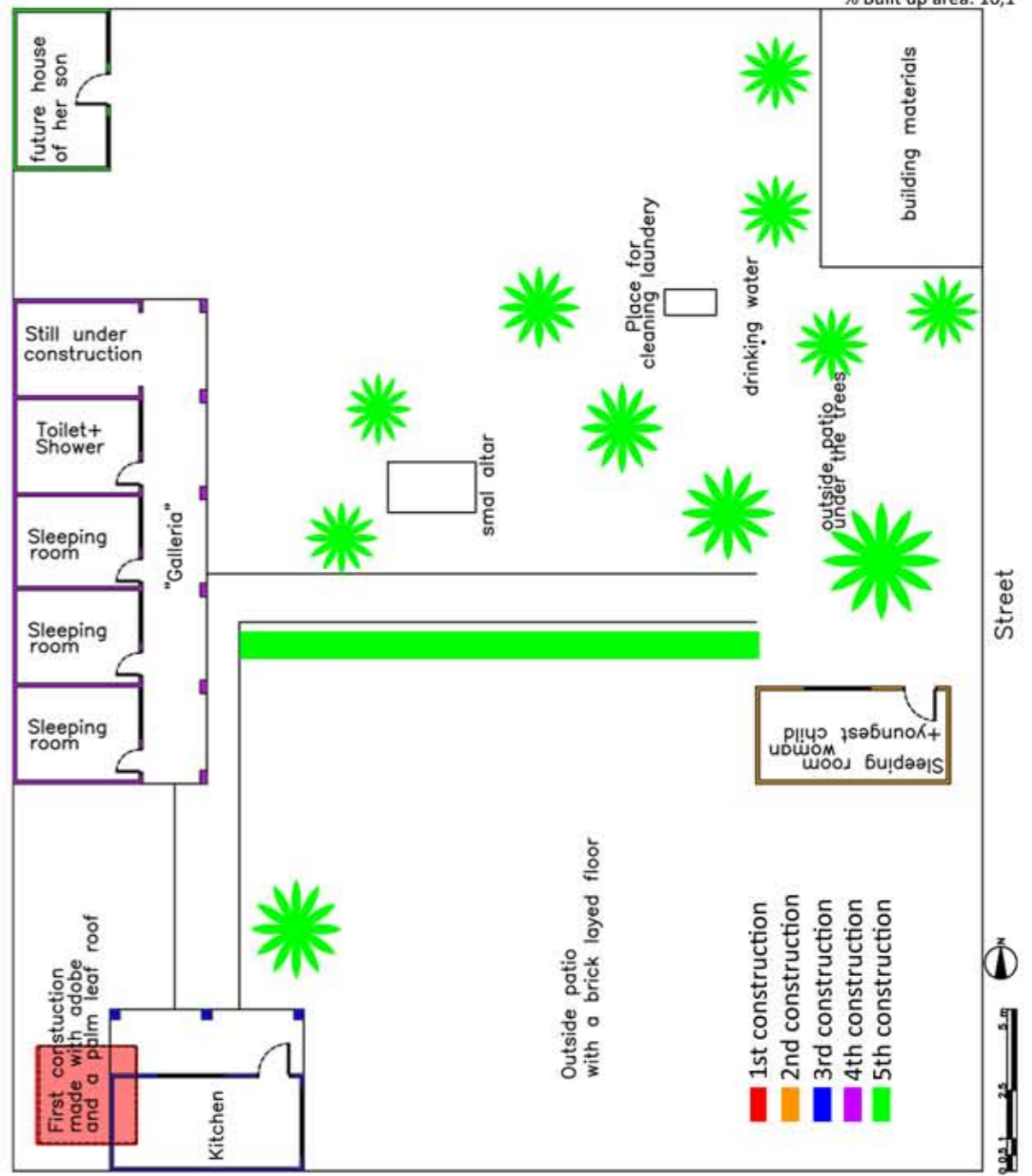


Different trees and in the back building materials.



Meeting place in the shadow

Family 5



Street

Family 6

Original local family in a consolidated neighbourhood
 Family members: 10
 Period of occupation: 13 years
 % Built up area: 19,6



The owner working in his workshop.



In front the outside living room and at the back the workshop



The big tree provides a lot of shade and creates living space.



Temporary kitchen



The first two constructions made with bricks and steel plates. They are used as bed rooms.



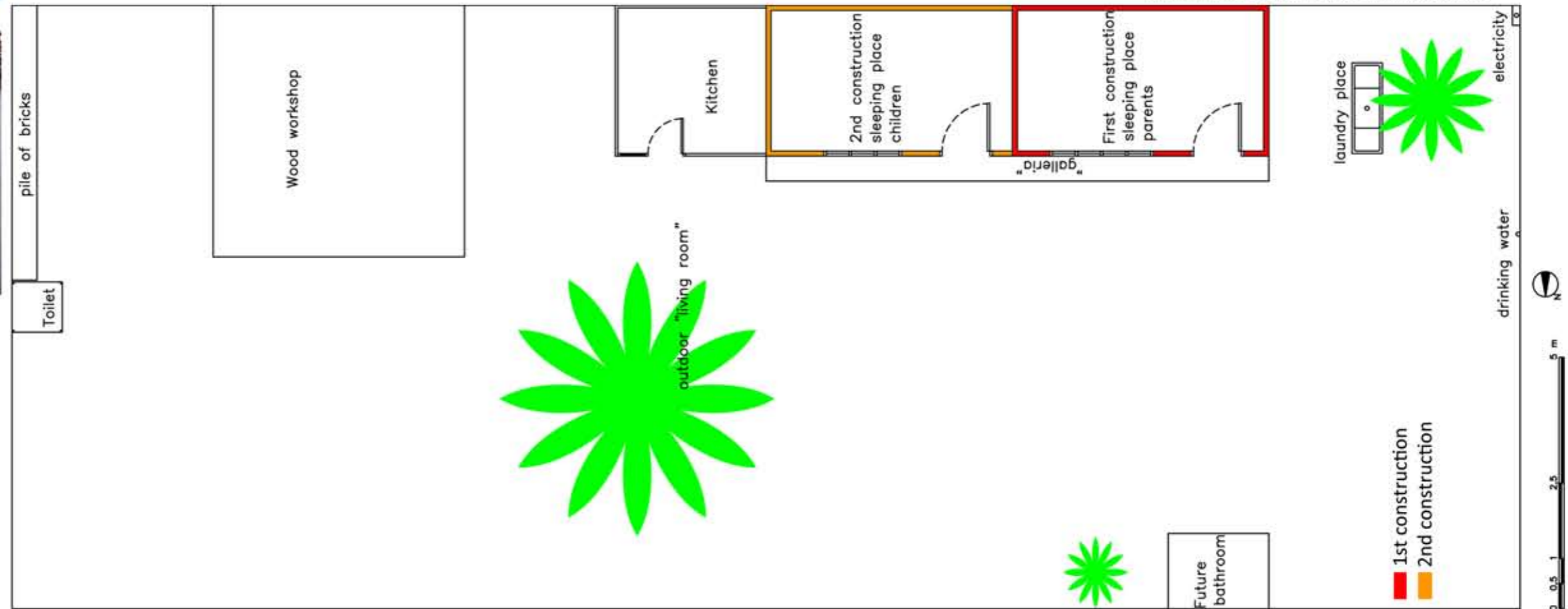
The current toilet



The domestic animal



Future bathroom will be constructed here



Family 7

Migrant family in a new neighbourhood

Family members: 5

Period of occupation: 15 years

% Built up area: 25,3



The water tap, in front of the kitchen



The old Kitchen

The laundry place in front of the bathroom



The Toilet and Shower



The newest construction



The owner in front of her house



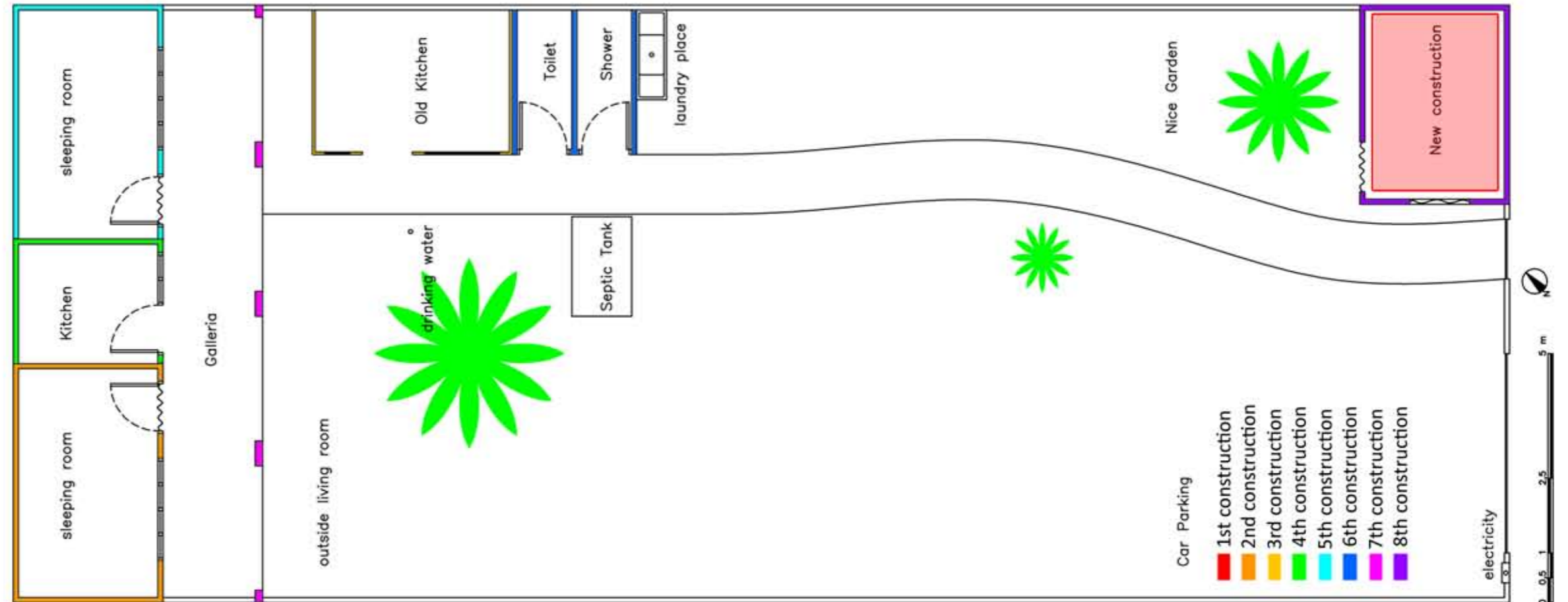
The entrance path with nice garden



Drying of the Laundry



The car parking



Family 8

Original local family in a new neighbourhood
 Family members: 6
 Period of occupation: 1 year
 % Built up area: 8,9



The 'garden' north-west of the house



The laundry place next to the toilet and shower



The renter under her galleria



The owner rents his house to this family until the house is finished

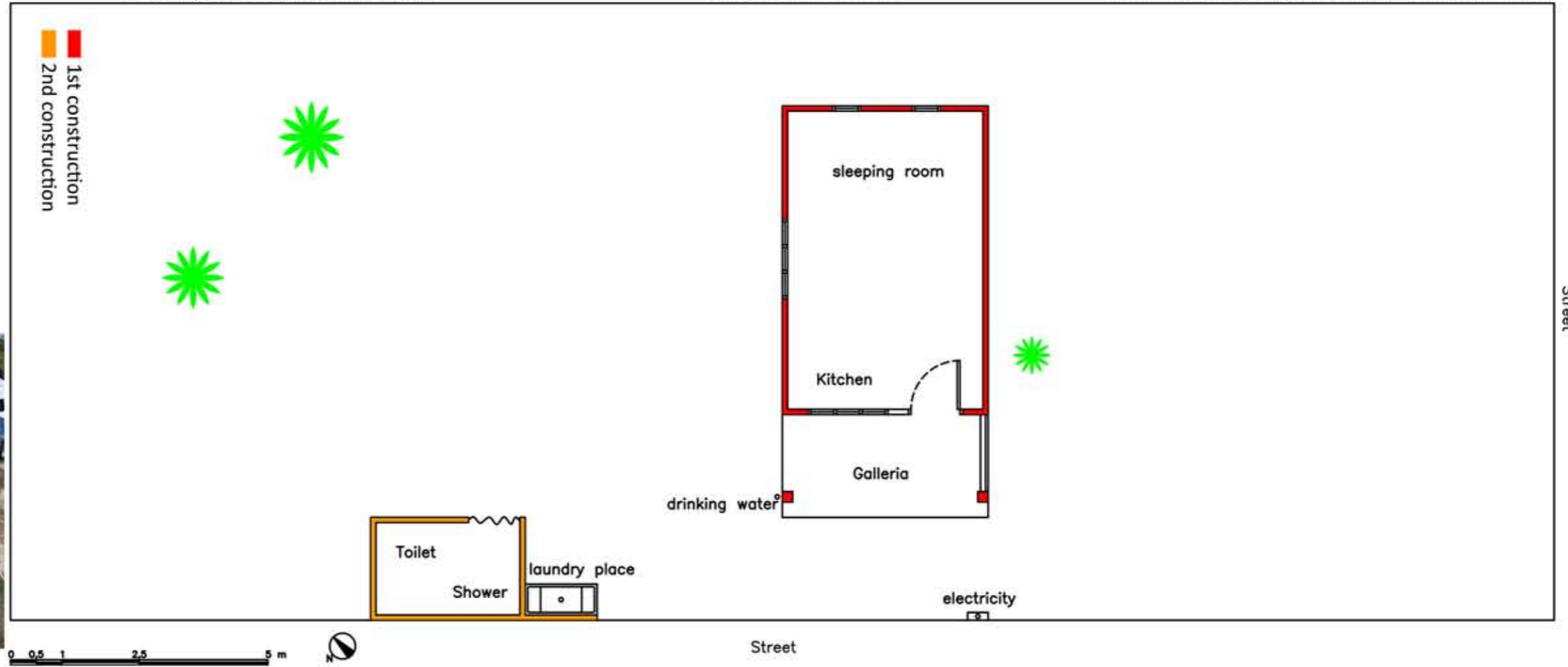


The 'garden' south-east of the house



Behind the house

The water tap





The Youth centre/living room



The outside living room



The kitchen



The first construction with 3 rooms and a kitchen a stair already leads to a future second floor



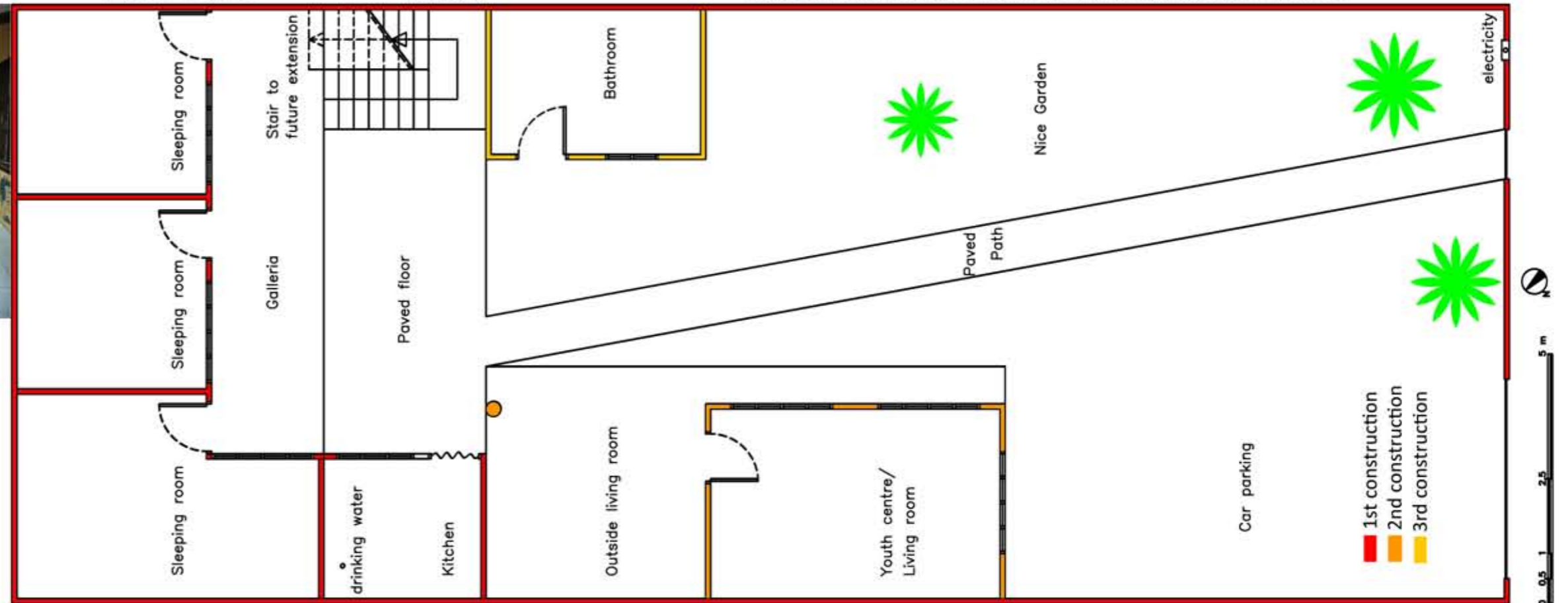
Family 9
Migrant family in a consolidated neighbourhood
Family members: 3
Period of occupation: 7 years
% Built up area: 31,0



The paved path



The nice garden





The interior of the kitchen



The kitchen



On the right the kitchen, on the left the gallery



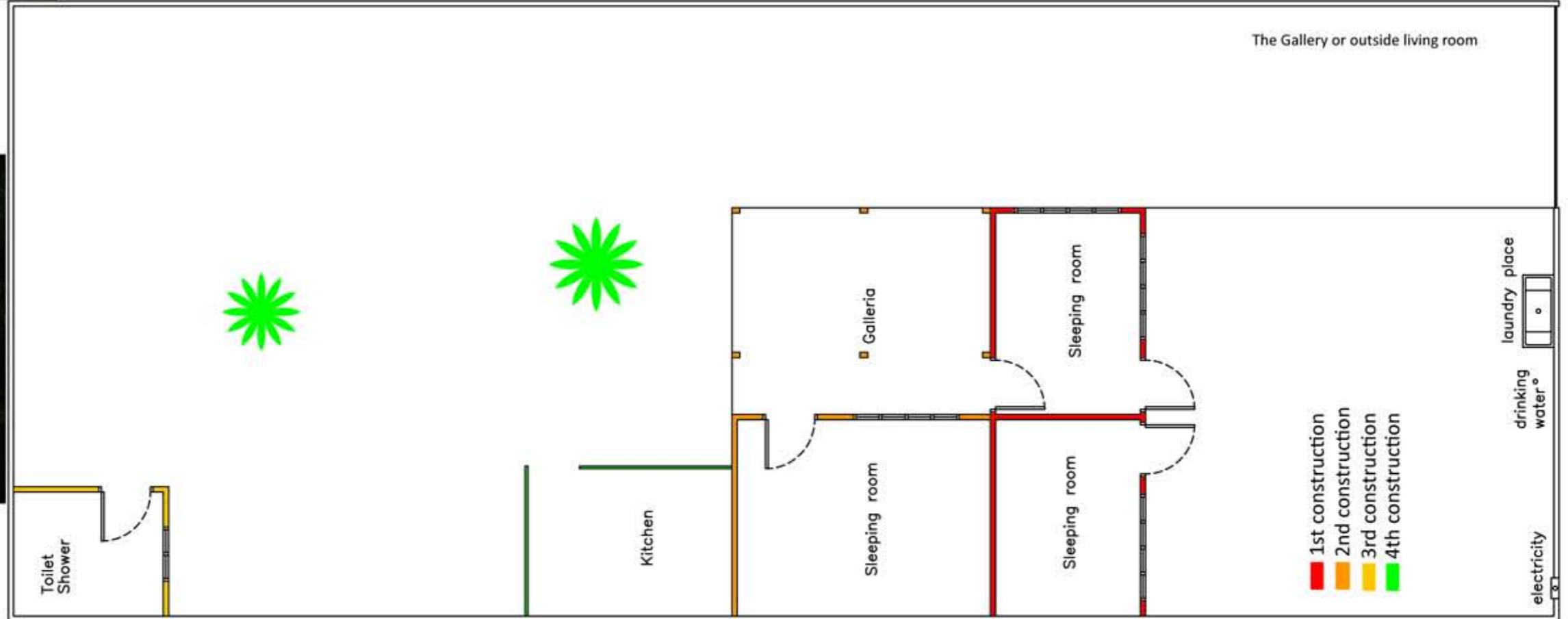
The first construction with 2 rooms



The Gallery or outside living room



The toilet and shower in the back



Family 11

Original local family in a new neighbourhood

Family members: 4

Period of occupation: 1 year

% Built up area: 11,4



Water problem to the right of the house



The shower



The facade of the kitchen



The kitchen



The entrance to the right room



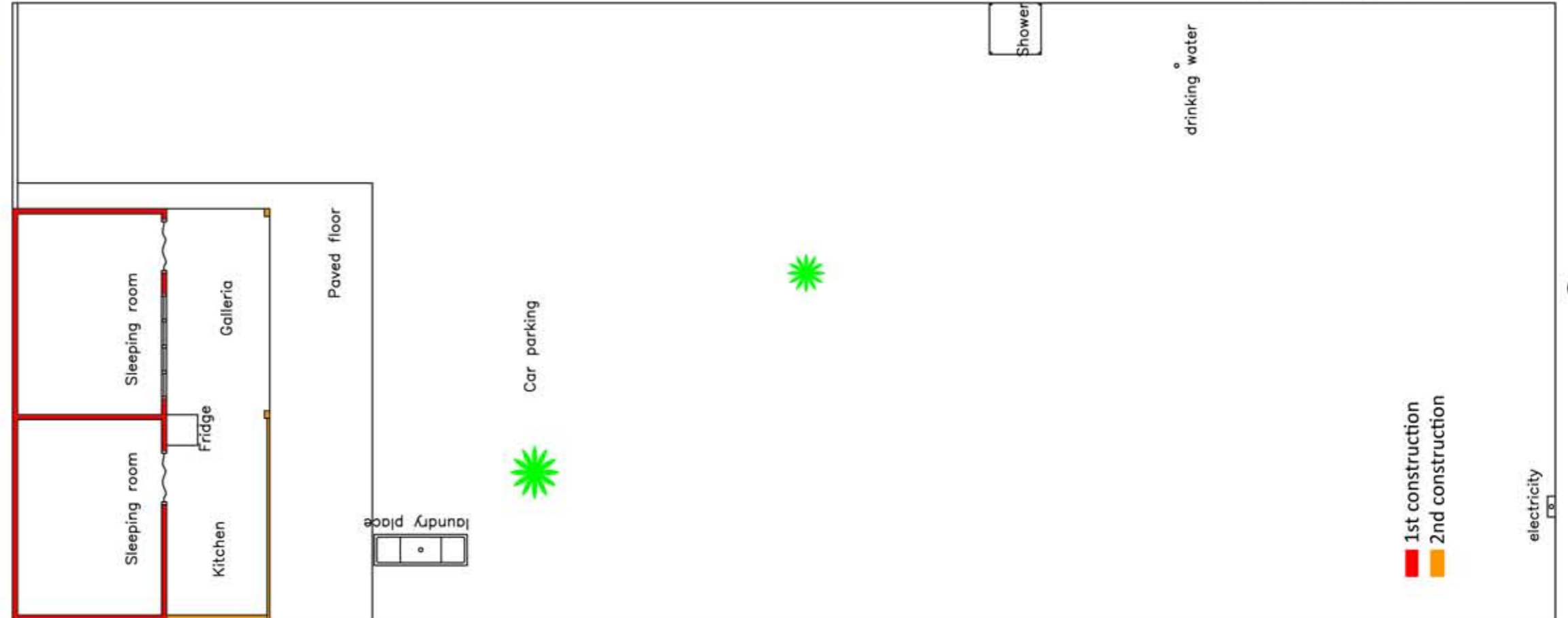
The owner in front of her house



The laundry place



A view from the house towards the street



Family 12

Original local family in a new neighbourhood
 Family members: 5
 Period of occupation: 4 years
 % Built up area: 8,9



The toilet and shower



The laundry place behind the house



The kitchen



The owner in front of her house



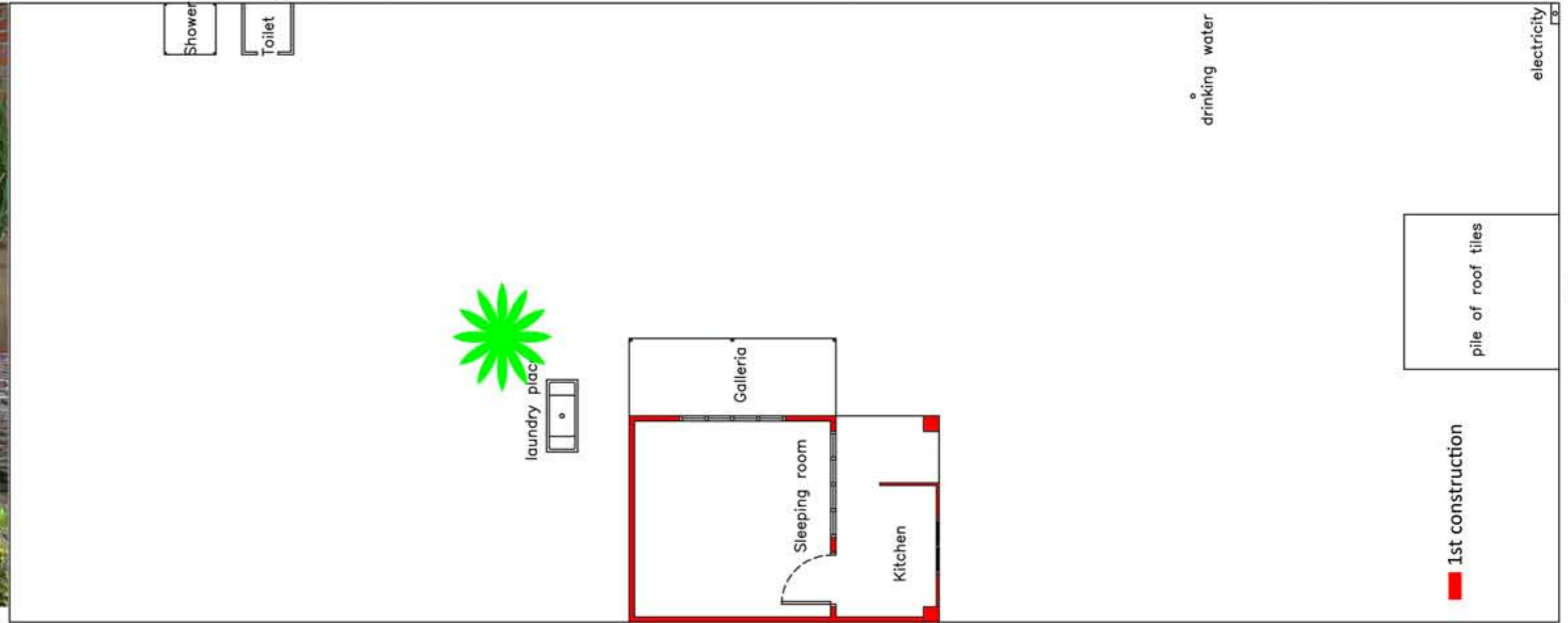
Water problem behind the house



Pile of roof tiles



Water tap



Appendix B CATCH method of SHF

SHF CATCH Methode, Comprehensive Approach To Community Based Habitat

CATCH®	1	2	3	4	5
SHF activities	<ul style="list-style-type: none"> ▪ Able to express family housing needs ▪ Able to distinguish between quality levels of building materials ▪ Able to assist in simple construction tasks 	<ul style="list-style-type: none"> ▪ Able to identify and express community housing and infrastructure needs ▪ Able to recognize and value construction materials characteristics ▪ Able to do supervised skilled construction work ▪ Able to understand technical construction decisions 	<ul style="list-style-type: none"> ▪ Able to read technical designs ▪ Able to do skilled construction work independently ▪ Able to understand construction theory 	<ul style="list-style-type: none"> ▪ Able to assist other communities implementing habitat programs ▪ Able to translate technical designs into construction procedures ▪ Able to facilitate other skilled construction workers ▪ Able to supervise construction works ▪ Qualified for multiple technical skills sets ▪ Able to coach others in obtaining building skills 	<ul style="list-style-type: none"> ▪ Able to implement habitat programs independently ▪ Able to run construction related businesses ▪ Able to implement and execute long term maintenance ▪ Able to research new construction methods and use of materials ▪ Able to design buildings and infrastructure ▪ Able to understand urban / rural planning
Capacity for executing building activities					
Partners activities	For below issues of community mobilisation SHF integrates its activities with partners who are well equipped and specialised in the area of community mobilisation				
Capacity to plan and implement	<ul style="list-style-type: none"> ▪ Able to hold a focused discussion and listen to others ideas ▪ Able to identify major problems, prioritize, and discuss potential strategies ▪ Able to plan and implement special one-day events 	<ul style="list-style-type: none"> ▪ Able to manage a basic savings and revolving loan fund system ▪ Able to coordinate community infrastructure contracts and projects (e.g. road, community center) ▪ Able to discuss and evaluate experiences 	<ul style="list-style-type: none"> ▪ Able to manage basic village programs (e.g. welfare, preschool, water user group) ▪ Able to gather and distribute relevant information on market prices and new techniques ▪ Able to understand market dynamics and transition to demand-oriented production ▪ Able to coordinate collective purchasing (e.g. agricultural inputs, coir, consumer goods) ▪ Able to formulate and monitor individual sub-committee plans ▪ Able to develop an overall annual plan ▪ Able to establish a monitoring mechanism 	<ul style="list-style-type: none"> ▪ Able to coordinate collective marketing ▪ Able to develop and analyze business plans ▪ Able to advocate on behalf of community ▪ Able to coordinate forward sales agreements 	<ul style="list-style-type: none"> ▪ Able to manage a community enterprise (e.g. rice mill, retail outlet, processing facility) ▪ Able to develop long-term strategic plans ▪ Able to streamline long-term income generation activities ▪ Able to register as a business
Administrative capacity	<ul style="list-style-type: none"> ▪ Able to function as a committee ▪ Able to conduct meetings ▪ Basic constitution established; all members familiar with it ▪ Able to maintain basic records (e.g. attendance, log book) ▪ Able to take responsibility for verbal agreements 	<ul style="list-style-type: none"> ▪ Able to conduct regular meetings and take decisions ▪ Basic bylaws established; all members familiar with them ▪ Able to collect basic socio-economic information on the village ▪ Able to maintain minutes and inventory; manage correspondence ▪ Registered with government 	<ul style="list-style-type: none"> ▪ Able to recruit and manage required staff (e.g. GM, accountant) ▪ Has functional sub-committees or groups to address different issues ▪ Has a neutral, permanent place to keep documents and meet ▪ Able to take responsibility for formal, written agreement 	<ul style="list-style-type: none"> ▪ Able to manage assets and resources ▪ Able to develop an advisory committee if needed 	<ul style="list-style-type: none"> ▪ Maximizes resources and assets ▪ Able to prepare annual progress report
	1	2	3	4	5
Financial management capacity	<ul style="list-style-type: none"> ▪ Able to collect membership fees ▪ Able to understand and maintain basic records (e.g. payments received) ▪ Able to appoint a financial focal person (e.g. treasurer) 	<ul style="list-style-type: none"> ▪ Able to manage savings (e.g. pass book) ▪ Able to maintain basic bookkeeping system on own (e.g. receipts, vouchers, ledgers, cash flow) ▪ Able to manage internal loan systems (e.g. loan applications, procedures) ▪ Able to prepare annual financial report 	<ul style="list-style-type: none"> ▪ Able to handle advanced bookkeeping (e.g. TB, cash book, bank dealings) ▪ Able to manage bank correspondence ▪ Able to manage loan disbursements from external lender according to proper criteria and with full recovery ▪ Able to submit final accounts documents to an auditor ▪ Able to manage a current account ▪ Has basic system for procurement and purchasing 	<ul style="list-style-type: none"> ▪ Able to allocate own capital to initiatives ▪ Able to organize staff payrolls (e.g. accountant, GM) ▪ Able to access external financial sources ▪ Able to access external services as needed (e.g. financial consultancy, insurance) ▪ Has advanced procurement procedures (e.g. tenders) ▪ Able to access all commercial bank facilities (e.g. overdraft) ▪ Able to do financial planning and forecasting 	<ul style="list-style-type: none"> ▪ Able to prepare and analyze annual financial report ▪ Able to maintain separate current accounts for different activities ▪ Has separate account assistants for different activities ▪ Able to manage investments ▪ Able to establish a shareholder system and pay dividends ▪ Properly registered with tax authorities ▪ Organization is financially secure (e.g. fixed deposit)
Leadership, participation, and group dynamics	<ul style="list-style-type: none"> ▪ Generally one-man show, little participation, traditional leadership 	<ul style="list-style-type: none"> ▪ Able to maintain a structured system to manage responsibilities (e.g. group leaders, executive committee) ▪ Participation in planning and decision making at a higher level ▪ Sharing responsibilities and power ▪ Improved gender balance at leadership level 	<ul style="list-style-type: none"> ▪ Able to identify and utilize the skills of people in the community ▪ Second generation leadership coming up 	<ul style="list-style-type: none"> ▪ Recognized by others as a competent CBO ▪ Fully committed members ▪ Sense of pride and ownership 	<ul style="list-style-type: none"> ▪ Self reliant, not dependent on outside groups ▪ Decentralized leadership ▪ Able to fully represent community in federation
Linkages	<ul style="list-style-type: none"> ▪ Coordinates with district and village-level officers ▪ Coordination within the village (elite groups, traditional leaders, religious leaders) ▪ Initial link with bank 	<ul style="list-style-type: none"> ▪ Coordinates at the district level with relevant government officers and elected officials ▪ Coordinates with other CBOs, and NGOs 	<ul style="list-style-type: none"> ▪ Coordinates with relevant departments at the district, provincial and national levels ▪ Local market links ▪ Able to access technical support and training as needed 	<ul style="list-style-type: none"> ▪ External market links (traders, companies) ▪ Able to link with advertising companies to promote products or services 	<ul style="list-style-type: none"> ▪ Able to link with Chamber of Commerce ▪ Able to link with national Ministries ▪ Able to become a member of CBO federation ▪ Able to link with donors independently

