

# TO CONTROL OR NOT TO CONTROL: THE ROLE OF SUSTAINABLE PLANNING IN ORDER TO ACCOMMODATE INFORMAL BRICKYARDS IN THE INTEGRATED DEVELOPMENT PLAN OF THE MANGAUNG MUNICIPALITY

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## ABSTRACT

During 1994 and 1999, the Bloemfontein Municipality amalgamated with five other municipalities to form the Mangaung Municipality. The Mangaung Municipality now has a population of approximately 740,000 and covers an area of 6,363 km<sup>2</sup>. Some areas are totally urban; while in others, people live in informal settlements. The unemployment rate is 35%, but in some areas it has risen to as high as 48%. Poor people in the city cannot afford to buy burnt bricks from the major suppliers of bricks. Therefore, informal brickyards were established all over the areas where clay and/or water were available. These brickyards are now producing good homemade burnt bricks and are creating jobs in a sea of unemployment. However, the problem is that from a planning and sustainability viewpoint, all is not well. Although the location of the brickyards has brought about a saving in costs related to the transportation of bricks from the formal brickyards, of which the nearest is 300 km away, the coal-burning activities of the informal brickyards create air pollution. Furthermore, no prior environmental impact studies were carried out before deciding on the location of the brickyards. Most of them have been established haphazardly in any available spot. This paper will explain how these problems could be handled within the context of sustainable planning. The environmental issues will need to be evaluated from a socioeconomic perspective. A proposed policy to guide future development will have to be part of the integrated development plan; and this paper will show how this could be effectuated in practice.

*Keywords: poverty, brickyards, earth bricks, sustainable planning, housing, unemployment, rammed earth.*

## 1 INTRODUCTION

One of the problems of planning in developing countries relates to the question of whether ‘to control or not to control’, which refers to the urgent necessity of creating jobs for a large number of unemployed people. In this article, background information in respect to Mangaung is outlined, after which the needs are considered. A description of the brickyards follows, together with a discussion of the use of raw earth as an alternative. The article ends with recommendations and a conclusion.

This part of the Free State is in the grassveld biome, which is a flat area, dotted intermittently with small hills. The soil is clayey, with numerous drainage courses. The average annual temperature has a relatively wide range of 15.2°C, while the annual rainfall is 564 mm and occurs during the summer months in the form of thundershowers [1]. Because the Free State is in a relatively dry area, the environment is sensitive.

## 2 BACKGROUND IN RESPECT TO THE SETTLEMENTS OF MANGAUNG

The Mangaung Municipality consists of the city of Bloemfontein (population of 365,000), Thaba Nchu (110,000), Botshabelo (225,000) and three other (rural) areas (40,000). Thaba Nchu and Botshabelo are situated approximately 60 km and 45 km east of Bloemfontein respectively, along the N8 road (Fig. 1). Population densities are very low, with 70,000 informal houses. There are 150,000 erven and 100,000 formal houses in Mangaung. The population growth rate in Bloemfontein was 2.3% between 1991 and 1996, while that of Thaba Nchu was 1.2%. Botshabelo, on the other hand, experienced a negative growth rate of 3.5%, showing that people were moving from there to Bloemfontein. With no industrial development to speak of, the unemployment rate is 35%–48% [2].



Figure 1: Locality map of the area.

The first inhabited area in the present-day Mangaung was Thaba Nchu, which means 'Dark Mountain'. It was first inhabited by the Barolong tribe under the leadership of Chief Moroka, with two Wesleyan missionaries, in approximately 1833. The missionaries were Jac Archbell and J. Edwards, who lived there with their families. Chief Moroka was the heir of Siffonello, who came from the north near Makwassie, on the run from Moselekatse. Chief Moroka entered into a transaction with Moshesh, the chief of the Basotho, in terms of which 9 head of cattle and 17 sheep or goats were paid to Moshesh in exchange for the land [3].

In 1836, the Voortrekkers arrived in Thaba Nchu. They constituted their own government before trekking to Kwa-Zulu Natal after two years. Some settled in the area of present-day Mangaung [3]. The relationship between the Barolong and the Afrikaners was a good one. During the Anglo-Boer War, one of the chieftains looked after the cattle of a neighboring farmer when the English were killing all the Afrikaners' livestock, and he returned the cattle to the farmer after the war [4].

Major Warden bought the farm Bloemfontein from Johannes N. Brits in 1846, to establish the town of Bloemfontein. It became the capital of the former Free State Republic and today is the seat of the Provincial Government of the Free State, and also the seat of the Court of Appeal. Bloemfontein has an educational, commercial and service sector. The city is divided according to racial lines. Industrial areas form buffer zones between the separate townships [2].

After 1948, the new government implemented a policy of separate development, better known as apartheid. Thaba Nchu became part of the Bophuthatswana homeland in December 1977. In February 1979, the south Sotho-speaking people were driven out of Thaba Nchu after an ethnic clash. About 60,000 Basothos were relocated to Botshabelo, which is situated southwest of Thaba Nchu [5]. 'Thaba Nchu has a more scattered development pattern with 37 traditional villages surrounding the urban

centre as far as 35 km from the urban core' [2]. Thaba Nchu has a rich cultural history. The indigenous people have their own distinctive style of earth construction. The building of earthen houses and the decoration of buildings are linked to their culture and form part of an annual event. However, the urbanization of the local people has alienated the people from their culture to a large extent.

Botshabelo means 'sanctuary' [6]. In 1988, Botshabelo housed about 207,000 people who had moved from farms and homelands to which they had formerly been restricted by law. The population subsequently grew to 225,000, according to the Integrated Development Plan for Mangaung of 2003. Botshabelo was developed according to a modern plan, with large arteries connecting the neighborhoods. The layout of the town is not compact. In fact, the town stretches over a vast area with large open spaces (mostly flood plains), and the Klein Modder River runs through it [2]. This layout did not suit the inhabitants, who had to walk for long distances, since very few of them owned vehicles.

In the townships around Bloemfontein, many people still live in houses built of raw earth. However, only the very poor build houses of raw earth today.

### 3 NEEDS OF THE PEOPLE

'There is also a growing realization that poverty is both a cause and effect of environmental degradation. In many developing countries, poverty and environmental degradation combine in a vicious circle' [7]. The Millennium Development Goals of the United Nations and Agenda 21 of the Rio Earth Summit place emphasis on poverty alleviation and sustainable resource management. Poverty is viewed as being interrelated with environmental degradation and stress [8].

Du Plessis and Landman have a different opinion: 'Because of their low levels of resource consumption, and their tendency to re-use and recycle, poor communities also have a negligible distal environmental impact, compared to more affluent communities. As settlements become more affluent, environmental burdens tend to become more diffuse, delayed and indirect. This tends to result in the displacement of environmental burdens' [9]. The impact of the more affluent settlements tends to take the form of greenhouse gas emissions resulting from higher levels of consumption. Better service levels contribute to increased consumption. Poorer settlements are responsible for air pollution, water pollution (pollution of water courses), deforestation and soil erosion, sometimes as a result of lower service levels [9]. The impact of the poor on the environment is more visual.

Thaba Nchu, Bloemfontein and Botshabelo were jointly demarcated as a growth pole and an industrial development point in 1982, which offered a wide range of incentives to attract industries [1]. These incentives were withdrawn after 1994. The industries declined and the number of workers dropped from 16,000 in the 1990s to 9,000 in 2004. Many of the inhabitants of Botshabelo came from the mines. In the gold-mining industry of the Free State, 120,000 jobs were lost during the last decade. The gold-mine crisis is a result of low gold price and a strong rand in relation to the dollar. The situation has worsened in the last decade: for example, a million jobs were lost in the agricultural sector. The unemployment figure is 35%, and in Thaba Nchu, it has risen to 48% [2].

There are currently many people living in erven, in informal housing, mostly made of corrugated iron. People who wish to improve their housing conditions have to order bricks from Bloemfontein; but bricks are presently not manufactured in that city and have to be transported from Gauteng and Odendaalsrus, approximately 400 km and 200 km away respectively. The bricks are expensive and, as a result of the high transportation costs, the option of buying these bricks is not available to most people. If materials have to be transported to the site, the costs and the environmental impact increase [10].

The people are in great need of employment and decent housing.

### 3.1 Employment

Du Plessis and Landman have the following to say about GEAR: ‘this macroeconomic strategy aims to strengthen economic growth in South Africa with a broadening of employment opportunities and the redistribution of economic opportunities and income in favor of the poor. However, it is not clear whether increased competitiveness between countries and cities within South Africa will always support the idea of the redistribution of economic opportunities’ [9].

Hall sees the strengths of the informal sector as a means of enabling developing countries to create better conditions for economic growth and employment-generation [11]. This is in accordance with the policy of the South African government to create jobs at the local level. The Integrated Development Plan theoretically empowers municipalities to link development to their budgets and to implement it locally. Stapelberg shows that the municipalities can function as agents for Local Economic Development by acting as coordinators, facilitators, stimulators and/or entrepreneurial developers [12].

One of the ways by which local entrepreneurs can create jobs is to make earth bricks and burn them in kilns. Water, clay and coal are needed to produce burnt bricks. The burnt bricks are made from a mixture of clay and gravel and are then sun-dried before being packed into a ziggurat-like (staggered tower) shape with pieces of coal in between, sealed off with clay. This homemade kiln is then set alight. In this way, the entrepreneurs supply the market with building material and create jobs. However, a problem is posed by the environmental consequences that arise from the making of these bricks.

### 3.2 Decent housing

According to some estimation, 30% of the world’s population still lives in houses of raw earth; while in Africa, the percentage may be as high as 50% [13]. The problem is that soil tends to be regarded as the building material of the poor. Recently, people who are concerned about the environment have begun to use raw earth as a building material and regard it as a source of job creation. Many countries use raw earth as a sustainable solution to minimize energy use, for example, Australia [13]. ‘In projects where the implications and real costs of certain service delivery options have been explained to beneficiaries, people have often been prepared to accept a lower level of service delivery, or [an] alternative technology option’ [9].

Informal houses built of corrugated iron are not viable. The most affordable and sustainable option is housing built with raw earth.

## 4 PRODUCTION OF BRICKS AND LOCATION OF BRICKYARDS

Most of the brick industries are situated around a suitable clay pit or near a source of water. In Thaba Nchu, the brickyards are near to markets, while in Bloemfontein and Botshabelo, they are mostly located near water.

Some of the benefits of informal brickyards are as follows:

- Informal brickyards can create jobs.
- They are suitable for operation by small production units such as families.
- They use local resources, and the work can be done by unskilled laborers.
- They are labor-intensive.
- A low level of capital investment is required.
- The product is tailor-made for clients, and production occurs close to the client base.

In Australia, earth bricks are most suitable for the needs of owner-builders with little money and plenty of free labor (unemployed people have the time to build their own houses) [14].

A survey on brickyards in Thaba Nchu and Botshabelo was conducted in March 2004. The findings of this survey included the following:

- The brickyards can be classified into two groups. 'Semi-formal' brickyards are located on a formal lot, allocated by the former municipal authority, however, without imposing any kind of levy. 'Informal' brickyards have no formal site and are scattered all over the settlement, mostly in public open spaces.
- This activity has created 133 jobs in settlements with high unemployment rates.
- The burnt bricks (approximately 400,000 per month) and cement blocks (approximately 24,000 per month) contribute to the building of a large number of houses.
- The burnt bricks are not environment friendly, but represent great savings in terms of transportation costs.

At that stage, no brickyards were found in Bloemfontein. However, owing to the economic success achieved in Thaba Nchu and Botshabelo, several brickyards have been established in Bloemfontein during the last year.

#### 5 FACTORS RELEVANT TO THE IMPACT OF THE BRICKYARDS ON THE ENVIRONMENT

Brickyards have a negative influence on the environment because:

- Clay is extracted from informal clay pits without any impact studies being conducted.
- The brickyards are located in open-space areas or near water courses.
- Kiln-fired bricks require high temperatures, using large amounts of energy and producing high volumes of greenhouse gases and pollutants.
- If the kiln is not watched closely, the bricks could overheat. When this happens, the bricks melt and cannot be used. On the brickyard sites, stacks of melted bricks accumulate and cannot be recycled. In most cases, the manufacturers who abandon the site tend to leave without rehabilitating the area.

The brickyards render a service to the community by providing more affordable bricks and creating jobs. However, they are detrimental to the environment. As an alternative, the building of houses with raw earth (unbaked bricks) is recommended.

#### 6 TYPES OF BRICKS MADE BY USING EARTH

(1) There are different types of earth constructions involving the use of materials such as mud bricks, rammed earth, as well as wattle and daub. Topsoil is not suitable for making earth bricks, as it contains organic material such as humus. The topsoil has to be removed and returned after the extraction, as part of the rehabilitation of the area.

- Mud bricks are dried in the sun and consist of clay, straw and water [10]. They are made by pouring a puddled mixture of clay, straw and sand into a mold and leaving the mixture to dry in the sun [13]. The walls made from these bricks have to be plastered.
- Rammed earth is a dryish sand mixture rammed into wall molds. The usual thickness of the molds is 600 mm, but in cases where cement is added, a thickness of 300 mm is common [13].
- A third technique, involving the use of wattle and daub, is well known. The roof is supported by a wooden structure. A lattice of wooden sticks is planted in between, and the structure is packed with clay [13]. Sometimes cow dung is used instead of clay, for example, in the Kalahari, owing to the scarcity of clay (one of the authors grew up in such a house).

(2) Transformed earth bricks can be produced in the form of stabilized earth bricks, cement blocks and burnt bricks.

- Another kind of brick can be produced by stabilizing the earth with 7% cement. This mixture dries more quickly and houses built of these bricks do not need plastering.
- Cement bricks and blocks are made of crushed stone mixed with sand and cement; sometimes coal ash or clinker is used.

People tend to prefer burnt bricks if they can afford a choice of material. Selection and testing of soil is important in order to determine the desired qualities, such as strength, low moisture absorption, and high resistance to erosion and to chemical spills. If earth-brick houses are not built with wide eaves, they require a great deal of maintenance [10].

#### 7 BENEFITS OF UNFIRED EARTH BRICKS AS BUILDING MATERIAL

The following benefits are associated with unfired earth bricks:

- The greatest advantage of an earth-constructed wall is the thermal mass. A wall of this type is usually thicker than walls constructed of burnt bricks. In areas with extensive fluctuations between day and night temperatures, the thermal qualities of earth bricks are considerable. Thermal properties refer to the balance between thermal transfer insulation and thermal storage insulation. More research on earth flooring is necessary in this regard.
- Earth building techniques are the most cost-effective in comparison with other construction methods.
- Construction with these materials generates less pollution.
- Earth building materials are the most recyclable of all masonry products.
- Other benefits include good acoustic properties. In earth buildings, problems are not experienced with reflected sound, and the thick walls prevent the transmission of sound.
- Mud-brick walls are fire-resistant.
- The level of energy consumed during the building of the earth-brick house is very low. Moreover, the low energy use during the life span of the building represents a considerable saving. At the production level, mud bricks require only 1/700th of the energy used by fired bricks.
- Some people love the color and texture of earth buildings.
- Earth buildings have low toxicity levels and are allergen-free.
- Well-designed earth buildings require low maintenance.

By combining the traditional techniques of earth building with waterproofing and durability, the beneficial properties of earth building can be increased [14]. Unfired earth is the ideal material for a sustainable future.

#### 8 SUSTAINABILITY IN HOUSING

Sustainability in housing means the use of less energy in building the house and in producing the material. It also entails reducing the need for cooling and heating throughout the life of the building. Another important aspect is the recyclability of the material of which the house is made. In Australia, building plans are approved based on an adequate level of thermal performance of the building to ensure efficient use of energy for heating and cooling [14].

Habitat for Humanity International has resolved to make maximal use of locally available materials. This approach has an empowering effect on the people of the community and is better for the environment. Good housing becomes available to more people in this way, while money is kept within the local economy, rather than being spent on importing materials, fuel and replacement parts [15].

The University of the Free State and the Technical University of Eindhoven in the Netherlands, funded by SANPAD (the South African Netherlands Research Programme on Alternatives in Development), are engaged in a three-year research project on earth bricks. One of the foci of the project concerns the attitude of the local population and the brick makers, and how to change this attitude.

When a single house is built with soil from the earth, a hole of about  $2 \times 3$  m in diameter and 300 mm deep is made. This hole soon disappears. The earth used is usually subsoil; and the hole can be filled with topsoil, which can be used for gardening or agriculture.

The main problem occurs when there is a need to make a large number of bricks. In such cases, the soil must be obtained from elsewhere, such as a quarry, to prevent environmental damage. Reducing the distance that a product has to be transported brings about ecological and economic benefits.

All over the world, there are examples of communities using earth building materials to construct houses and other buildings, creating wealth in the process.

## 9 RECOMMENDATIONS

In a sea of unemployment, the brickyards are rendering a service; there is a demand for bricks and jobs are thereby created. The clay pits could be controlled by the local government and made available to the people at a minimal price, as part of Local Economic Development projects. The Integrated Development Plan should be amended to allow for this new land use in demarcated areas. Long-term funds should be allocated to develop these brickyards in order to supply bricks locally for the government housing projects.

The local government should rezone the erven for the kilns, or give consent for the use of the current erven for a period of time. The occupants of the adjacent erven should be consulted as well. The site could be rented or granted rent-free privileges. In terms of environmental impact, a rehabilitation plan should be put in place for all the brickyards and the clay pits. A partnership between the local government and the entrepreneurs could be entered into for the rehabilitation of the sites.

The local government should amend the building standards, so as to accommodate houses built from earth bricks.

In the meantime, with the aid of the project funded by SANPAD, attitudes may change. Modern earth bricks could then be produced, resulting in environmental benefits.

Management skills could help to increase the number of bricks produced per person per day.

## 10 CONCLUSION

The local government should regard the informal brickyards as an opportunity to create jobs and to render service to the very poor. If the attitudes of some people could be changed, the environment would benefit from building with earth bricks. The local government, the local population and the brick makers could build a sustainable future for all concerned.

Technology could be used to improve traditional building methods; and settlements could become less reliant on the cash economy by using the earth that God gave us.

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