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 ± 740 000 and covers an area of 6 363 km². Some areas are totally urban, while in others, people are living 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. Informal brickyards were established all over the given areas where clay and/or water were available. These brickyards are now producing good home-made burnt bricks and are creating jobs in a sea of unemployment.

The problem however is that from a planning and sustainability viewpoint, all is not well. Although the location of the brickyards brings about a saving in costs for the transportation of bricks from the formal brickyards, of which the nearest is 300 km away, the coal-burning activities of the informal brickyards are creating air pollution. Furthermore, no prior environmental impact studies were carried out for the location of the brickyards. Most of them have simply been established haphazardly, in any available spot.

This paper will show how these problems could be handled within the context of sustainable planning. The environmental issues will need to be evaluated from a socio-economic 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 is “to control or not to control” meaning that you are pressed to create jobs for the large number of unemployed people.

The Mangaung Municipality consists of the city of Bloemfontein (365 000 persons), Thaba ‘Nchu (110 000), Botshabelo (225 000) and three other (rural) areas (40 000). The latter two are approximately 60 and 45 kilometres east of Bloemfontein on the N8 road. 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, Thaba ‘Nchu was 1.2% and Botshabelo has a negative growth rate of 3.5% showing that people are moving to Bloemfontein. With no industrial development to speak of the unemployment rate is 35 to 48% (MLM [1]).

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 15.2ºC, while the annual rainfall is 564mm and occurs in the summer months in the form of thunder-showers (Department of Constitutional Development and Planning [2]). Because the Free State is in a relative dry area the environment is more sensitive to damage.

2 Background of the settlements of Mangaung

The first inhabited place in the present day Mangaung was Thaba Nchu. Thaba Nchu, which means “Dark Mountain”, was first inhabited by a Barolong tribe under 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 nine head of cattle and seventeen sheep or goats were paid to Moshesh in exchange for the land (Van der Wath [3]).

In 1836 the Voortrekkers arrived in Thaba Nchu and they constituted their own government before trekking to Kwa-Zulu Natal after two years. Some settled in the area of the present day Mangaung (Van der Wath [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 neighbouring farmer when the English were killing all the Afrikaners’ livestock, and he returned the cattle to the farmer after the war (Steyn [4]).

Major Warden bought the farm Bloemfontein from Johannes N. Brits in 1846 to establish the town 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 is 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 (MLM [1]).

After 1948 the new government implemented the 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 situated to the south-west of Thaba Nchu (Steýn [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 (MLM [1])”. 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 the buildings are linked to their culture and form part of an annual event. The urbanization of the local people has alienated the people from their culture to a large extent.

Figure 1: Locality map of the area.

Botshabelo means “sanctuary” (Coetzee [6]). In 1988 Botshabelo housed about 207 000 people who had moved from farms and homelands where they had 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 neighbourhoods. The layout of the town is not compact, but the town stretches over a vast area with big open spaces, (mostly flood plains) and
the Klein Modder River runs through it (MLM [1]). This layout did not suit the inhabitants, who had to walk far distances, since very few of them owned vehicles.

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

3 Poverty

“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” (Whitman [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 (United Nations [8]).

Thaba Nchu, Bloemfontein and Botshabelo was demarcated as a growth pole and an industrial development point in 1982, which offered a wide range of incentives to attract industries (Department of Constitutional Development and Planning [2]). These incentives were withdrawn after 1994. The industries declined and the number of workers dropped from 16 000 in the nineties to 9 000 in 2004. Many of the inhabitants of Botshabelo came from the mines. In the Free State gold-mining industry, 120 000 jobs were lost during the last decade. The gold-mine crisis is the result of the low gold price and the 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 has risen to 48% in Thaba Nchu (MLM [1]).

In Thaba Nchu, Bloemfontein and Botshabelo, there are many poor people who live in informal housing. People who wish to improve their housing conditions have to order bricks from Bloemfontein but no bricks are presently manufactured in Bloemfontein. Bricks are transported from Gauteng and Odendaalsrus. Gauteng is about 400km away and Odendaalsrus, 200km. The bricks are expensive and as a result of the high transportation costs, the option of buying these bricks is out of reach for most people. If material has to be transported to the site, the costs and environmental impact increase (Twinshare [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 (Hall [10]). This is in accordance with the policy of the South African government to create jobs at local level. The Integrated Development Plan theoretically empowers municipalities to link development to their budget, and to implement it locally. Stapelberg shows that the municipalities can be agents for Local Economic Development (LED) by acting as coordinators, facilitators, stimulators or entrepreneurial developers (Stapelberg [11]).
4 Types of bricks using earth

There are (a) different types of earth construction, such as mud bricks, rammed earth as well as wattle and daub.

- Mud bricks are dried in the sun and consist of clay, straw and water (Twinshare [9]). They are made by pouring a puddled mixture of clay, straw and sand into a mould and leaving the mixture in the sun to dry (Moor and Heathcote [12]). The walls made from these bricks have to be plastered.

- Rammed earth is a dryish sand mixture rammed into wall moulds. The usual thickness is 600mm, but in cases where cement is added, a thickness of 300mm is common (Moor and Heathcote [12]).

- 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 (Moor and Heathcote [12]). Sometimes cow-dung is used instead of clay, for example in the Kalahari, owing to the scarcity of clay (the author grew up in such a house).

And (b) transformed earth bricks 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 crushed stone mixed with sand and cement; sometimes they used coal ash or clinker.

- The people prefer burnt bricks if they can afford a choice of material. Water, clay and coal are needed to produce burnt bricks. The burnt bricks are made from a mixture of clay 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 home-made kiln is set alight.

Selection and testing of soil is important in order to determine the desired qualities such as strength, low moisture absorption, high resistance to erosion and to chemical spills. Top-soil is not suitable for making earth bricks, as it contains organic material such as humus. The top-soil has to be removed and returned after the extraction, as part of the rehabilitation of the area. If earth brick houses are not built with wide eaves, they require a great deal of maintenance (Twinshare [9]).

One way of alleviating poverty by the local entrepreneurs is to make earth bricks and burn it in kilns. In this way they supply the market with building material and create jobs. The problem is the environmental consequences.

5 Production and location of brickyards

Most of the brick industries are situated around a suitable clay pit, or near to 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 labourers.
- They are labour 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 a lot of free labour (unemployed people have the time to build their own houses) (Dobson [13]).

A survey was done in March 2004 on brickyards in Thaba Nchu and Botshabelo. The following was found namely:

- The brickyards can be classified into two groups. “Semi-formal” means that the brickyard is located on a formal lot, allocated by the former municipal authority. However, no levy of any kind has been imposed. “Informal” means that there is no formal site and the brickyards 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 (±400 000) and cement blocks (24 000) per month contribute to the building of a large number of houses. The burnt bricks are not environment-friendly but they represent great savings in terms of transportation costs.

At that stage no brickyards were found in Bloemfontein but due to the economic success in Thaba’Nchu and Botshabelo several had been established in Bloemfontein in the last year.

6 The following factors are relevant in respect of 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 having been 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 these brickyard sites, stacks of these melted bricks have accumulated. In most cases, when the manufacturers abandon the site, they tend to leave without rehabilitating the area. These melted bricks cannot be recycled.
7 Benefits of unfired earth bricks as building material

The following benefits are associated with unfired earth bricks namely:

- 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-time and night-time 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 there is no problem with reflected sound; and the thick walls prevent the transmission of sound.
- Mud brick walls are fire resistant.
- The levels of energy consumed during the building of the earth-brick house are 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 colour 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 (Dobson [13]). 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 the house. In Australia buildings must have an adequate level of thermal performance to ensure efficient use of energy for heating and cooling, before building plans are approved (Dobson [13]).

Habitat for Humanity International resolved to make maximal use of locally-available materials. This 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, money is kept within the local economy, rather than being spent on importing materials, fuel and replacement parts (Nelson [14]).

According to some estimations, 30% of the world's population still live in houses of raw earth, while in Africa; the percentage may be as high as 50%
(Moor and Heathcote [12]). 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 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 in Australia (Moor and Heathcote [12]).

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 x 3 metres in diameter, and 300mm deep, is formed. 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 travels brings 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 How to control these brickyards and make them sustainable

In a sea of unemployment, the brickyards are rendering a service; there is a demand for the bricks and jobs are thereby created. The clay pits could be controlled by 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 so as to allow for this new land use in demarcated areas. Long-term funds should be allocated to develop these brickyards, in order to supply local bricks 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 into 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 change their 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. A modern earth brick 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

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

References