The transformation of a Jerusalem urban brownfield site into an urban park

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Summary: This research examined the land cover changes around a new redevelopment project, the “Train-Track Park”, in Jerusalem (Israel). The old Jerusalem-Jaffa railway track has been redeveloped into a new urban park and opened in 2013. The aims of this research were two: 1. to quantitatively re-construct and examine the land cover changes of the site and surrounding neighborhoods in three time periods, 1881, 1967, and 2013; 2. to examine in what way did the railway site has changed along with the changes of the surroundings neighborhoods and what could have been the reasons for these changes. The study revealed that the landscape of the area has changed dramatically, from mostly open space to a dense urban area. Moreover, the research has demonstrated that the changes in the railway site and the surrounding neighborhoods are interlinked. Lastly, the research has found that the land cover changes have been caused mainly by political forces, and much later from an urbanization process.

Introduction

Green spaces play an important role in present-day urban areas. They provide many social, health and environmental benefits. They can raise the quality of life by creating a sense of community, providing pleasant places for physical activity and relaxation, they lower temperatures in their surroundings, filter pollutants and protect local ecosystem (Elmqvist et al. 2015; Germann-Chiari and Seeland 2004; Brown, Schebella, and Weber 2014; Tratalos et al. 2007; Bertram and Rehdanz 2015). While the benefits of green spaces in urban areas are known, many dense urban areas lack these areas. One solution to this challenge is the redevelopment of brownfield sites and other unused and neglected areas (Alker et al. 2000; Yount 2003; Davis 2002).

A redevelopment of brownfield site in Jerusalem began in 2010 and ended in 2015. The redevelopment project was the transformation of the old the Jaffa-Jerusalem railway track into a new urban park the “Train-Track Park” (Figure 1). The old Jaffa-Jerusalem railway track operated from 1892 until 1998 when it stopped working for reparation. In 2005 a new train station, Malha Station, was built ~5 km southwest of the previously central train station, the First Station. As a result, the area between the First Station and Malha Station became abandoned and with time also became an environmental hazard area. Various redevelopment plans for this neglected area were proposed. In 2008 the plan for the redevelopment of the area into a park was finally approved. The park opened in stages from 2012 until its full reopening in 2015. Today the First Station area has become a public open pedestrian center consisting of cafes, restaurants, and shops while the Train-Track Park has become a busy park for pedestrians and cyclists which come to the park for a walk, to exercise or participate in different community activities.

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The neighborhoods of Jerusalem are divided and separated from each other. Some neighborhoods are predominantly Jewish or Arabs and also within these groups sub-divisions exists (Rokem and Vaughan 2018; Hasson 2001). Jewish neighborhoods are divided between secular-religious neighborhoods and orthodox ones while the Arab neighborhoods are divided into predominantly Christian or Muslim ones. Furthermore, as is the case in every city, there are the socio-economic differences between neighborhoods. The Train-Track Park passes through eight neighborhoods and one industrial area and represents the diversity that exists in Jerusalem neighborhoods. The aims of this research were two: 1. to quantitatively reconstruct and examine the land cover changes of the site and surrounding neighborhoods in three time periods, 1881, 1967, and 2013; 2. to examine in what way did the railway site has changed along with the changes of the surroundings neighborhoods and what could have been the reasons for these changes.

**Methodology**

**Research area**

The study area is the Train-Track Park and the eight surrounding neighborhoods and one industrial area (Figure 2). The Train-Track Park is ~6 km, the average width of the Train-Track Park is 14 m long, and it covers an area of about 0.08 km². The total area of the eight surrounding neighborhoods and industrial area is 11.7 km². The Train-Track Park starts at the original Jerusalem railway station,
the First Station, and ends at the operating train station, Malha Station, which has started to function in 2005.

Figure 2. The research area that includes the Train-Track Park (yellow line) and the adjacent neighborhoods and industrial area (black polygons). The TTP starts at the First Station compound and ends a bit after the new Malha train station.

**Study sources**

In this research five cartographical sources were used for reconstructing the land cover between 1881 and 2013. For the reconstruction of the 1881, the Palestine Exploration Fund map at a scale of 1:63,360 was used. This map was done by the British Corps of Royal Engineers between the years 1871 – 1877 and finally published in 1881 (Conder and Kitchener 1881). The second set of map used was a 1967 Israeli map at a scale of 1:10,000 published by the Survey of Israel (Survey of Israel 1967). Since a small area in the south of Jerusalem was missing from the 1:00,000 map, an additional map of Jerusalem at a scale of 1:50,000 was used (Survey of Israel 1968). The third source used was a 2013 satellite image of Jerusalem provided by ESRI in a resolution of 0.5 m (ESRI 2013).

**Land cover mapping**

The entire research area which included the Train-Track Park, and the surrounded neighborhoods were reconstructed in three time periods, 1881, 1967 and 2013. These periods saw big political and demographic changes in the city. Each map used in this research was first geo-referenced. Then the maps were digitized at a scale of 1:10,000 – 1:5,000. For the digitization process a set of four land cover categories were chosen: built areas (buildings and main roads), open spaces (natural areas
including areas of Mediterranean batha, garrigue and small groves), parks (urban gardens or parks) and orchards. The digitized process was performed using ArcGIS software (10.5.1).

Results

Land cover mapping changes

Overall, three land cover categories were identified in the area on the 1881 map: built areas, open spaces and orchards, and orchards (Figure 3A, Table 1). In the 1967 and the 2013 satellite imagery parks were identified as one additional category (Figure 3B and C, Table 1). The most dominant land cover category on the 1881 map was open space (87.32%) whereas the smallest category was built areas (0.15%) (Table 1). On the 1967 map open space areas (46.53%) were still the most dominant land cover categories but it has decreased, and the second most dominant category was built area (34.96%). Moreover, between 1881 and 1967, orchard area has increase slightly from 12% to 18% (Table 1). On the 2013 satellite imagery the most dominant land cover category was built areas (79.37%). While the once most dominant category, open space, has decreases over the years and in 2013 was 16.01% of the total area. It is possible to see how open spaces have diminished from 1881 to 2013 and in 2013 were mostly found in a few areas in the south and south-west part of the research area (Figure 3A and Figure 3C). With regards to the park category, it increased from 0.02% in 1967 to 2.14% in 2013 (Table 1). Indeed, only in Figure 3C can we start to see a few of these parks which are mostly inside dense built areas.

<table>
<thead>
<tr>
<th>Land cover category / Year</th>
<th>1881 Area in m²</th>
<th>1881 % of Total Area</th>
<th>1967 Area in m²</th>
<th>1967 % of Total Area</th>
<th>2013 Area in m²</th>
<th>2013 % of Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built area</td>
<td>17281</td>
<td>0.15</td>
<td>4100998</td>
<td>34.96</td>
<td>9301302</td>
<td>79.37</td>
</tr>
<tr>
<td>Open space</td>
<td>10224505</td>
<td>87.32</td>
<td>5458002</td>
<td>46.53</td>
<td>1875683</td>
<td>16.01</td>
</tr>
<tr>
<td>Orchards</td>
<td>1467624</td>
<td>12.53</td>
<td>2168620</td>
<td>18.49</td>
<td>290597</td>
<td>2.48</td>
</tr>
<tr>
<td>Park</td>
<td>-</td>
<td>-</td>
<td>2229</td>
<td>0.02</td>
<td>250877</td>
<td>2.14</td>
</tr>
</tbody>
</table>

Table 1. Land cover changes in the researched area between three periods, 1881, 1967 and 2013.
Figure 3. Digitized land cover maps showing the researched area before the construction of the train tracks (1881) (A) in 1967 when the railway was fully at work (1967) (B) and immediately after the opening of the Train-Track Park (2013) (C).
Discussion

Land cover mapping changes

One of the aims of this research were to examine in what way did the railway site has changed along with the changes of the surroundings neighborhoods. The research showed that there is a strong interlink between the changes in the neighborhoods and the changes in the past railway tracks.

In 1881, the research area was an empty area with only one small village in its center, Beit Safafa. In addition, there were also three other settlements just outside the research area - in the north-east, the Old City of Jerusalem, and in the west two village, Malah and Sherafat. The rest of the research area was mostly open spaces which included different natural features such as the Mediterranean Batha areas which were non-irrigated agricultural fields and grazing lands (Conder, Kitchener, Palmer, & Besant, 1881; Tristram, 1884). In the research area also a few agricultural areas surrounding the main settlements could be found. Based on the PEF memoirs these orchards consisted mainly of olive trees along with some pear, pomegranate and fig trees (Conder et al. 1882; Tristram 1884). Some orchards found on the 1881 map, north of Beit Safafa still exist today (Figure 3). In 1881, the area of the present Train-Track Park was a small water stream called Wadi el Wird (it can be seen on the PEF map) which then flowed into the Refaim and Soreq Rivers and finally into the Mediterranean Sea (Paton 1907). Today this stream is almost invisible and can be only seen near Makor Haim section of the Park, as a concrete channel and near the Malha Train Station, as an open stream (Figure 2).

The end of the 19th century saw the beginning of new development, growth in population and the entrance of new European powers to the region (Gerber 1982). All these changes promoted the construction of the Jaffa-Jerusalem railway. Work on the railway began in 1890 and started working two year later in 1892. A few new neighborhoods such as the German Colony and Baka, were intentionally built on the route of the Jaffa-Jerusalem trainline being a central place of passage for people and goods (Kroyanker 1996). The German Colony neighborhood was created at the end of the 19th century by German Christian Templers. In contrast, Baka neighborhood was created by Arab Muslims living in the dense Old City who decided to move to this empty area which was also a crossroad between the city of Jerusalem, Beit-Lehem and Hebron (Kroyanker 1996). With the establishment of additional neighborhoods in Jerusalem and along the railway line, so did the agricultural areas around them increased. In 1917 the Ottoman Empire collapsed, and Jerusalem came under the rule of the British Mandate. The British Mandate promoted the agricultural sector and more areas became agricultural lands (Reuveny 1993). The British mandate ended in 1948 and Jerusalem was divided into two cities, one under Jordanian control and the other under Israeli control. While this research examined the period of 1967, which was 19 years after the British left Jerusalem, it is possible to notice how the orchard areas have increased and accounted for 18% of the total research area in that year (Figure 3B).

Jerusalem was a divided city for 19 year between 1948 and 1967. After the Arab Israeli Six-Day war of 1967, the city was united under Israeli control and have remined to this day. During the period of 1948 and 1967, Israel had put a lot of effort in making the west city of Jerusalem the capital city of the State of Israel. These actions included moving the house of parliament and other government offices to Jerusalem, establishing cultural institutions in the city and encouraging Jewish settlement in the city. One of the ways to increase the percentage of Jews living in the Jerusalem was to settle new Jewish immigrants in various neighborhoods in Jerusalem (Hananal 2017). Some
of new immigrants were put in abandoned Arab neighborhoods. For example, Malha, an Arab village was occupied by the Israeli army during the 1948 war. The houses remained empty until 1951 when new Jewish immigrants from Kurdistan, Tunisia and Morocco arrived and settled there. Another example is Abu Tor, an Arab neighborhood which during the 1948 war, was divided. Israelis conquered the west side of the neighborhood while the Jordanian conquered the east side. When the war ended, new Jewish immigrants, mostly from North Africa and the Middle East, were settled into the abandoned houses on the west side (Israeli 2002). Other new immigrants were put in new social houses constructed by the Israeli government. Between 1950s and the 1970s three new neighborhoods which are found in the research areas, were constructed, Gonenim-Katamonim, Katamon Het-Tet and Pat. The first buildings were constructed to provide housing for the new Jewish immigrants that survived the Holocaust in Europe, and later also to Jews who fled from Arab countries (Lissak 2003). The results of this research show that in 1967 the built area has increase on the expense of open space area. The results of the 1967 period indeed show an increase in the built area which have amounted to 34% of the total research area. It is interesting to note that in 1967 there was only one park in the research area. One possible reason could be that in 1967 there were still many open areas all around the research area and the need for a park was not very strong.

The final period examined in this research was 2013, a year after the opening of the new Train-Track Park. The result shows a very dense urban area, mostly built (79% of the total research area). Since the 1970s but mostly from the end of the 1980s and start of the 1990s a real process of urbanization took place. For example, in 1990s the Jerusalem Municipality decided to build a new neighborhood around the old and poor neighborhood of Malah. The new development included the construction of a large neighborhood of villas, the largest shopping mall in Jerusalem, a Jerusalem sports stadium and a new technological compound (Municipality 2017). Another example is Talpiot Industrial area. In the 1970s, many garages and workshops moved from the city center into this area. In the 1980s and into the 1990s new shopping malls started to open. In 2013 the Municipality decided to develop this area as a mixed-use area including an employment-commercial zone and on its outskirts, a new residential zone (Municipality 2017). The railway tracks once found surrounded by open areas become surrounded by dense built areas. The railways became a border separating the neighborhoods, a place of noise and pollution to be avoid. While we can see that in 2013 there was an increase in urban parks, they still amount to just 2% of the total research area. There are also some open space areas found but they are mostly located at the city’s outskirts and not in the middle of the dense built area. In the dense built area created in the study area, it is difficult to find additional open spaces that can be maintained or turned into a new urban park. Although the Train-Track Park is very narrow park (only 14 m), its length (~6 km) makes it feel as a big park and provides another green area for the residents of all the neighborhoods.

This research is unique since it has two parallel stories. The first story is on the changes in the railway area. The second story is on the changes in the neighborhood areas surrounding the Train-Track Park. Each of these areas changes throughout the periods for different reasons but despite their separation, there is also a close link between them. Throughout the period examined, it can be seen how the two areas change and complement each other.
References


Survey of Israel. 1967. “Map - Jerusalem 1:10,000 [Hebrew].” Tel Aviv: Survey of Israel.


