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The actual impact of comprehensive land-use plans: Insights from high resolution observations

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ABSTRACT

Like most EU and US planning systems, planning in Israel aims to promote certainty regarding future development by employing statutory land-use plans for stabilizing and binding the development of land use. In Israel, district planning from the 1980s onwards took place in the form of long-term land-use plans. However, in practice, Israeli planning witnessed a movement toward discretionary-oriented decision-making, providing for revisions of the land-use plans and subsequently diminishing its efficacy. A pending reform suggests eliminating district land-use plans and absorbing them into national and local plans. Concerning the debate on the future of the Israeli planning system, this research aims to assess the gap between certainty-oriented regulation and actual development, often occurring on a case-by-case basis. Our aim is to evaluate the actual performance of a district land-use plan, focusing particularly on aspects of land-use. Remote Sensing and GIS-based Plan Implementation Evaluation (PIE) analysis was used to test the impact of a comprehensive outline plan for Israel's Central District on the actual development of the built environment. The results show fundamental gaps between the original land-use assignments of the district plan and actual development. The limited effectiveness of regulatory land-use planning for complex, densely populated districts is then discussed in line with the certainty–flexibility dilemma in land-use planning and the structure of planning decision-making in Israel.

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Introduction

The Israeli Planning and Building Law of 1965 is facing a radical pending reform: a recently proposed planning law offers to soften existing zoning-oriented land-use planning tools and transform the regulative system into a more discretionary one. Among other changes, the new bill – still subject to Knesset (Israeli parliament) deliberation – proposes to change the nature of the national plans from regulatory, land-use and zoning-oriented to policy-oriented papers, to delegate more decision-making powers to the local planning commissions, and to completely eliminate the comprehensive district land-use plan.

This imminent reform of the Israeli planning mechanism results from a long lasting unease with the performance of the land-use planning system: current planning requires a frustratingly extended period of time (an average of 7–10 years for the authorization of detailed plans); the formal top-to-bottom hierarchy is ineffective, as district planning commissions must also adhere to many amendments to the comprehensive land-use plans; and planning decisions raise exhausting conflicts on local and national

scales, involving governmental ministries, municipal authorities and NGOs (PMO, 2010; MOIN, 2011).

While these are certainly bothersome issues worthy of being addressed, the approaching reform nevertheless provokes criticism. The main critics are environmental and social NGOs. Specifically, reform opponents claim that the impending cancellation of the district plan tier will prove disastrous as these plans serve as the last barricade against irresponsible development in the remaining open spaces and countryside landscape. In addition, the opposing bodies claim that the actual performance of comprehensive and long-term land-use district planning has not been seriously researched and, therefore, its positive role may be underestimated. They demand that those instigating and supporting the reform reassess the contribution and significance of this planning tool.

Insufficient knowledge regarding the implementation and performance of comprehensive land-use plans is a common problem in planning. Planning theory and practice are supported by a large body of knowledge dealing with the justification of planning, as well as the rationale for cooperation between planning agencies and decision-making authorities. Yet, thus far, very little has been written about planning implementation and execution. Despite few, albeit impressive, attempts to develop suitable tools, Plan Implementation Evaluation (PIE) is still in its infancy, lacking both

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adequate theory and appropriate methodologies. PIE is, therefore, still unable to answer two fundamental and complementary questions: “To what extent are urban and regional areas formed according to long-term land-use plans?” and “To what extent do comprehensive land-use plans confine urban and regional development?” Needless to say, the answers to these questions would prove profoundly significant, as many regulatory-oriented planning systems employ comprehensive land-use plans as a central tool for carrying out planning policies. Aside from the vast effort invested in planning, land-use plans have a direct economic effect on land value and property rights. Should these plans prove to have a marginal effect on overall spatial development, the current mass usage of this tool and even the premise of comprehensive planning may be questioned. The significant gap between a plan's outline and actual reality may point to the need to seek for other forms of long-term regulations, which are better suited to promoting planning certainty and protecting public values, like those offered in the pending Israeli land-use planning reform.

This paper contributes to the scant extant PIE literature by focusing on the impact of comprehensive, long-term plans on actual development. Particularly, the utility of the outline (zoning) plan is challenged here. In line with the dilemma facing the Israeli planning system, this research applies PIE analysis to critically assess the implementation of a long-term land-use plan in Israel's Central District. Research methodology includes a comparison between the original zoning plan and the actual land-uses realized in the district, identified by means of Remote Sensing (RS) and GIS tools. The use of these modern tools enables the evaluation of plan implementation at high resolution and wide scale, a combination that, to the best of our knowledge, has not been used in prior studies.

Land-use planning: between certainty and flexibility

Planning, and particularly statutory planning, was traditionally legitimized through its role in securing public interest and promoting public welfare (Meyerson and Banfield, 1955; Barry, 1964; Altschuler, 1965; Faludi, 1973; Moore, 1978; Campbell and Marshall, 2002). With this main goal in mind, regulatory planning traditions (that is, planning systems that use statutory zoning plans) employ land-use plans in a twofold role: (i) to articulate the formal, governmental and municipal planning policies and (ii) to deliver specific planning rights to land owners and stakeholders. The land-use plan sets different rules for different zones. As the various regulations in the allocation of planning rights bind all related stakeholders, this method of statutory planning appears to safeguard public interest. In particular, statutory land-use plans encompass two complementary tools: land-use (zoning) maps that detail permitted/future land-uses in various zones of planned areas, and ordinances or regulations that specify the terms for realizing planning rights and delineating authorized building features. Together these tools reflect current policy and instruct relevant stakeholders as to their rights.

The regulatory planning tradition operating in many countries, including most EU and US states, enables the occasional amendment of land-use maps and ordinances, consequently adjusting allocated planning rights under specific circumstances. The result is often the amassing of changes to the original planning policy (Cullingworth, 1993; Booth, 1996; Kwartler, 1998; Buitelaar and Sorel, 2010; Buitelaar et al., 2011). The ability of planning to safeguard the broad scope of public interest is thus challenged (Booth, 1996; Newman and Thornley, 1996). Other planning tools aside from the land-use map were recently highlighted with rising interest in strategic planning in many EU countries (Albrecht et al., 2003; Albrecht, 2004) and in the growing awareness to the ordinances that complement the outline plan, such as the US Smart

Growth ordinances (Duany and Talen, 2002a; Talen and Knaap, 2003; Emerson, 2006). Nevertheless, as comprehensive outline land-use plans continue to form a central pillar of statutory planning, examining the actual performance of this tool is extremely relevant.

Planning is a dynamic process. New needs, opportunities, fashions, technologies and ideas arouse bottom-up pressures that challenge top-down plans. The abundance of plan revisions and the flexibility required in practice are the underlying motives of our interest in using PIE. According to Booth (1996, 2003), regulatory planning systems face the inevitable certainty–discretion dilemma: on the one hand, strict, detailed land-use plans rapidly become functionally obsolete, and on the other hand, general, flexible, discretionary-oriented land-use plans are incapable of determining future land-uses and providing stakeholders with sufficient certainty. This is particularly true of the Israeli planning mechanism. Detailed local plans that attempt to change and amend the comprehensive land-use plans often stem from specific initiatives and relate to specific opportunities. The approval of such local amendments is usually based on local considerations that make no pretense of assessing their relevance to the entire land-use plan. The result is incremental policy-change, often realized only in retrospect rather than in the course of action. While local amendments of the land-use plans are a legal and established routine, the bothersome outcome is that of sliding into what Booth (1996) termed ‘para-polity’ – a form of polity that is not revealed in formal documents but is rather formed piecemeal by individual, lower-level decisions of the planning hierarchy.

The practice of preparing long-term, large scale land-use plans and then amending them in response to bottom-up emergence of plans is criticized from the viewpoint of the certainty–discretion dilemma: statutory plans aim to ensure future development as the planner sees it *now*; and bottom-up adjustment can take us too far from the plans' goals *in the future* (Needham, 2006; Moroni, 2007). The inevitable time gap between legislation and the start of development makes the plan, from the beginning, outdated. In Israel, for example, where great effort is invested in the planning process, the planning process and the authorization of a district outline plan can take ten years or even longer. This does not indicate awkwardness in the country's planning system, but rather this is an outcome of its evolution: preparation of a district plan requires the involvement of planning commissions from the local and national tiers, in addition to the endeavors of the relevant district commission. The specificity and preciseness of the land-use map call for prolonged discussions. The allocation of specific land-uses raises many objections to the plan and is the subject of many deliberations with city and rural settlement planners. The specificity of the land-use map is also the reason for many of the amendments to the plan, which require, by law, the involvement of planning commissions from the local, the district and the national levels. Therefore, the degree to which the original land-use map guides actual development highlights both theoretical and practical controversies.

The certainty–discretion dilemma encompasses another central issue, relating to the legal aspect of land-use plans. As noted by Salet (2002), planning and law are two normative disciplines interconnected in practice more than in theory. Beside the planning implications, statutory land-use plans play a substantial legislative role, as they are used to inform relevant stakeholders of permissible future land-uses and to formulate them and make them binding by law. The extent to which land-use plans adhere to the *rule of law* as a general idea was challenged in the pioneer work of Moroni (2007, 2010). Moroni's argument refers to traditional land-use regulations, which he claims do not adhere to the basic demands of *rule of law*, including legal impartiality, legal stability, publicity and non-retroactivity. Equally troubling is the practice of amending the comprehensive land-use plans and regulations. In the words

of Moroni (2007), the accumulated imposition of legal instructions in the form of local plans and spot programs signify “the gradual dying-out of law itself” (Moroni, 2007, 150). While Moroni’s work is mainly theoretical, our aim here is to add a practical, empirical layer to the discussion on the ethical and legal performance of land-use maps and to contribute to the current debate regarding planning in Israel.

Few alternatives to planning regulations have been proposed that could replace the statutory land-use map. These alternatives search for clear, abstract laws that would substitute the detailed traditional zoning regulations. Moroni (2007, 160) claims that “the more complex an (urban) system becomes, the greater is the need for abstract, general and end-independent [planning] rules to favor a sort of beneficial, spontaneous order – self-coordinating and polycentric – of individual actions”. He specifically calls for public authorities to “regulate the actions of individuals (allowing landowners to make use of their land, as suggested by their particular knowledge of circumstances of time and place, within a framework of common rules that apply equally to everyone, and as long as such land use does not create a serious nuisance for others) and plan their own actions” – as opposed to the way statutory land-use plans operate, attempting to plan the actions of individuals and creating specific rules for specific locations. This viewpoint was put into formal terms by the Self-Planned City (SPC) model presented by Alfasi and Portugali (2007, 2009). According to their approach, “planning must maintain a clear separation between the three authorities, the legislative, the judiciary and the executive”. In the SPC view, public authorities should be responsible for setting clear rules for urban planning, while avoiding the regulation of land use by means of zoning maps. Specifically, Alfasi and Portugali (2009) suggest developing an *urban code*, an abstract yet clear set of regulations that would provide certainty in qualities of the built environment, rather than imposing the quantity and location of land-uses. The urban code specifies principles for the development of urban elements based on their spatial adjacency. Development can take place anywhere by anyone, as long as the urban code remains inviolate. The *Transect Planning* model offered by Duany and Talen (2002b) provides an insight into the urban code, suggesting an applicable set of abstract regulation mechanisms that could replace the zoning map. The Transect is a regulatory (urban) code based on a New Urbanist view that specifies the qualities of the various patterns encapsulating the human environment. The specifics of the streetscape code, for example, are detailed in accordance to street type, whether in a rural reserve, a sub-urban area, or an urban core. Planning rights that stem from the Transect specifications restrict developers from certain actions while safeguarding the qualities of the built environment and creating a sense of certainty for current users of the environment. The Transect specifications are an alternative to the zoning map and provide the basis for regulated planning. Discretely from the works of Moroni (2007, 2010) and those of Alfasi and Portugali (2007, 2009), Duany and Talen (2002b) aim at creating qualitative certainty for civilians and developers by means of offering clear abstract rules for designing the complex human environment.

This paper is a field study on the impact of the statutory plan on actual development and the extent to which it creates terms of (un)certainly. It begins with a concise review of the literature on PIE. We then provide a short introduction to the role and extent of long-term land-use planning and the use of zoning maps in Israel. Our data, taken from the presentation of District Outline Plan 3 (DOP3), Israel’s Central District land-use plan from 1982, and its subsequent District Outline Plan 3/21 (DOP3/21) from 2002, are then described. DOP3 and DOP3/21 are then compared with the actual development in Israel’s Central District at four specific periods in time: 1980, 1990, 2000 and 2006, based on interpretation and analysis of aerial photographs from these years. The

comparison aims to address two key questions: (a) Did development occur in the general locations indicated by the plan? Particularly, were the areas assigned for development by the original zoning map actually developed, and were they used for the purpose outlined in the original map? (b) Did the areas marked “not-for-development” remain untouched? That is, did the actual expansion of land-uses adhere to the limitations specified in the original plan and avoid the diffusion to agricultural and open spaces? This study focused on 12 test areas representing 10% of the Central District and quantifying the type and amount of land actually developed over three periods: 1980–1990, 1990–2000, and 2000–2006. Based on the study findings, we discuss the extent to which the original land-use plan actually affected development in the Central District, as well as the possible later local and discrete amendments to the plan that shaped the built environment. We then reflect on the role of comprehensive land-use planning in Israel and refer to the impending reform aimed at terminating this planning tool.

Evaluating the flexibility gap

Planning theorists have shown little interest in the issue of PIE. As noted three decades ago by Alterman and Hill (1978) and Calkins (1979), large-scale land-use plans are usually adopted regardless of the factors and processes that could impact the achievement of the plan objectives. Though land-use plans have remained a central pillar in planning practice in many EU countries, as well as in the US, their actual implementation is usually left uninvestigated. Several attempts have been made over the years to assess the impact of land-use plans on actual spatial development, but on the whole this still remains a nascent field of study (Brody and Highfield, 2005; Seasons, 2003; Talen, 1996a,b). Within the loose framework of planning, the problem of how to evaluate a plan’s impact is far from being solved.

Scholars have referred to several methodological problems that hinder the application of the PIE framework. The main question addresses the comparison between conformance versus performance. That is to say, assessing the plan’s impact according to its outcomes and the degree to which it adheres to the fundamental intention (conformance) – an approach taken by Alterman and Hill (1978), Brody and Highfield (2005), and Talen (1997); or evaluating the plan’s implementation in terms of ordinances’ impact on planning discourse and on specific planning decisions (performance), as concluded by Dalton (1989), Laurian et al. (2004), Berke et al. (2006), and Oliveira and Pinho (2009). These two concepts induce two alternative views of the criteria applied when evaluating long-term plans and their outcomes. Conformance-based PIE views the plan from the planning product perspective, meaning the blueprint and declared or official policy. Conversely, performance-based PIE examines the plan’s impact on local discourse and its effect on the continuous process of policy making and implementation, rather than its ability to lead toward a specific end (Driessen, 1997; Alexander and Faludi, 1989; Faludi, 2006; Alexander, 2006a,b).

Other theoretical and methodological questions regarding meaningful PIE are: Which aspects of the plan and its implementation should be evaluated? Should evaluation focus on the specified planning instructions or, more generally, the ‘spirit’ of the plan? There are only a handful of researches studying the field of PIE, and even fewer investigate the relations between the original land-use plan and subsequent development. Alterman and Hill (1978), for example, investigated the fate of a land-use plan in Israel and found that two-thirds of the land-uses designated in the plan were actually implemented, which they considered to be a relatively high level of plan implementation. Their investigation was based on data obtained from detailed local plans that followed the

comprehensive land-use plan. The research was based on visual inspection and manual comparison between the plan and the later land-use maps, and this has not been repeated in Israel since.

Our research builds on the recent advances in GIS and Remote Sensing technologies and data collection. The accumulation of high-resolution data from the last three decades, in measures of both space and time, enables a comprehensive and detailed comparison between the original plan and the actual development occurring during the planned period, thus testing the extent to which development adheres to the original land-use allocation. This paper examines the effect of the original land-use map on actual development, rather than measuring the general success of DOP3 and DOP3/21, and it further examines the extent to which specific features of the initial, comprehensive plan were implemented. We adopt the conformance-based approach, looking at the disparity between the initial comprehensive land-use map and the actual development as representing the degree to which development followed the original policy. The conformance approach aims at assessing the consequences of the “flexibility gap” evolving gradually from the actual bottom-up practice of authorizing local amendments to the comprehensive land-use plan, as described by Alfasi (2006). In addition, studies regarding land-use cover change (Orenstein, 2004; Orenstein and Hamburg, 2009, 2010) and urban sprawl (Frenkel and Ashkenazi, 2008) in Israel relate the rapid and massive land-use change in population growth and economic development, while the role of the land-use plan in guiding these changes remains indistinct. Consequently, performance of the district land-use plan has remained uninvestigated.

Although focused on a single case study, this research explores a common, widespread process taking place in Israeli planning practice. In our on-going research process we found that more than 75 local amendments had been authorized for DOP4/14, the comprehensive land-use plan for the Southern District of 2000. Approximately half the amendments to that plan relate to the construction of new settlements, small farms, villages and towns. The impact of the original land-use plan appears to be doubtful. Therefore, we see our research on the conformance to DOP3 and DOP3/21 as substantially representing the fate of comprehensive, large-scale land-use plans in Israel and in other regulative traditions. The value of this case study lies in the combination of three components: first, the use of an innovative approach, as this is the first study assessing the performance of large-scale district land-use plans in Israel; second, reliance on high resolution data, relating to the utility of the original plan regarding a variety of land-uses; and third, in the wide perspective of our data, covering a large area in a Central District and relating to a long period of 26 years.

Planning in Israel

Scholars usually associate the strict top-to-bottom structure of the land-use allocation system to the ideological character of spatial development in Israel (Alexander et al., 1983; Alexander, 2001). The centrality of the planning system is also associated with the continuous need to provide a framework for a continually growing population, and the accelerating transformation of economic activity (Hill, 1986; Alterman, 2001). In Israel's early days, national planning guided the development of the built environment, the country's industrialization, and the population distribution (Shachar, 1998). Centrality of planning was considered necessary so long as the country sustained a high population growth rate and industrial growth. Over 60 years Israel's original population of 700,000 reached more than 7 million. At the same time, the standard of living has soared as Gross Domestic Product per capita has grown sixfold since 1950 and is now nearing OECD levels, with \$28,303 in 2009.

Since the establishment of Israel as an independent state, spatial planning has been designed using a top-to-bottom system, employing statutory zoning as a comprehensive framework for development (Shachar, 1998; Alterman, 2001). Although initiated during the pre-1948 British regime, land-use zoning in Israel resembles US standard zoning, with statutory outline plans determining long-term planning policies as well as allocating specific planning rights. However, unlike planning in the US, the Israeli system is based on a three-tiered spatial hierarchy consisting of national, district and local levels, with each producing long-term land-use plans. These outline plans are actually comprehensive zoning plans that include zoning maps to define general land-uses (starting from the highest national level and further specified at the district and local levels), in addition to ordinances delineating building characteristics. A complementary chain of statutory bodies oversees top-down planning performance, with each tier subject to the dictates of its superior level.

Israel's current planning system was formed in the late 1960s and shaped by the 1965 Planning and Building Law. The first wave of district plans was launched in the 1980s, with the DOP3 comprising an important part of that wave; the second wave only arrived in the early 2000s. In response to the first wave, municipal authorities prepared and adopted the ensuing local outline plans. However, in the early 1990s, Israel faced the massive entry of immigrants from the former Soviet Union. By late 1994, more than 500,000 people had arrived, and that number grew to nearly a million by the end of the decade. In the face of this upcoming mass immigration, and with a pressing need to update spatial plans, in 1991 a new National Outline Plan (NOP 31) was authorized. In reaction to essentially faster-than-expected population growth, a decade later a series of district and local outline plans was also authorized, including DOP 3/21 – an updated plan for the Central District authorized in 2002.

Two decades of implementing DOP3 clearly demonstrate that the official top-to-bottom planning sequence is frequently interrupted at local levels, resulting from the gap between the formal structure of planning and the bottom-up emergence of development and building initiatives. The imposition of legal requirements may lead to the gradual change in original district plans and regulations, as predicted by Booth (1996). Similarly to other regulatory planning systems (Cullingworth, 1994; Booth, 1996; Tewdwr-Jones, 1999), the certainty-oriented approach of the Israeli planning system faces inherent difficulties when confronted with the need to adopt flexible planning and decision – making tools that can respond to local planning initiatives (Alfasi, 2006).

Israel's Central District

Israel is divided into six districts, with the Northern and Southern Districts being the largest in area and the smallest in population, and the Central and Tel Aviv Districts being the smallest in area and the largest in population size. The Central District, covering an area of 1,294 km², encircles the Tel Aviv District from three directions; the two districts together now make up the metropolitan area of Tel Aviv (Fig. 1).

Since the 1960s the area has experienced steady population growth at an annual rate of 3%, mainly due to stable and high birth rate and to immigration (ICBS, 2008). From 580,000 residents in 1972, the district's population tripled to 1,730,000 by 2007, when the population of the entire Tel Aviv metropolitan area numbered about 3 million (Table 1). From the 1970s onwards, with the decline of profitability from agriculture, single-dwelling, low-rise housing was widely developed on former agricultural land in Israel's central region. Suburbanization was accelerated as urban populations started to migrate to small towns and villages on the outskirts of Tel Aviv (Feitelson, 1999; Gonen, 1995, 1996).

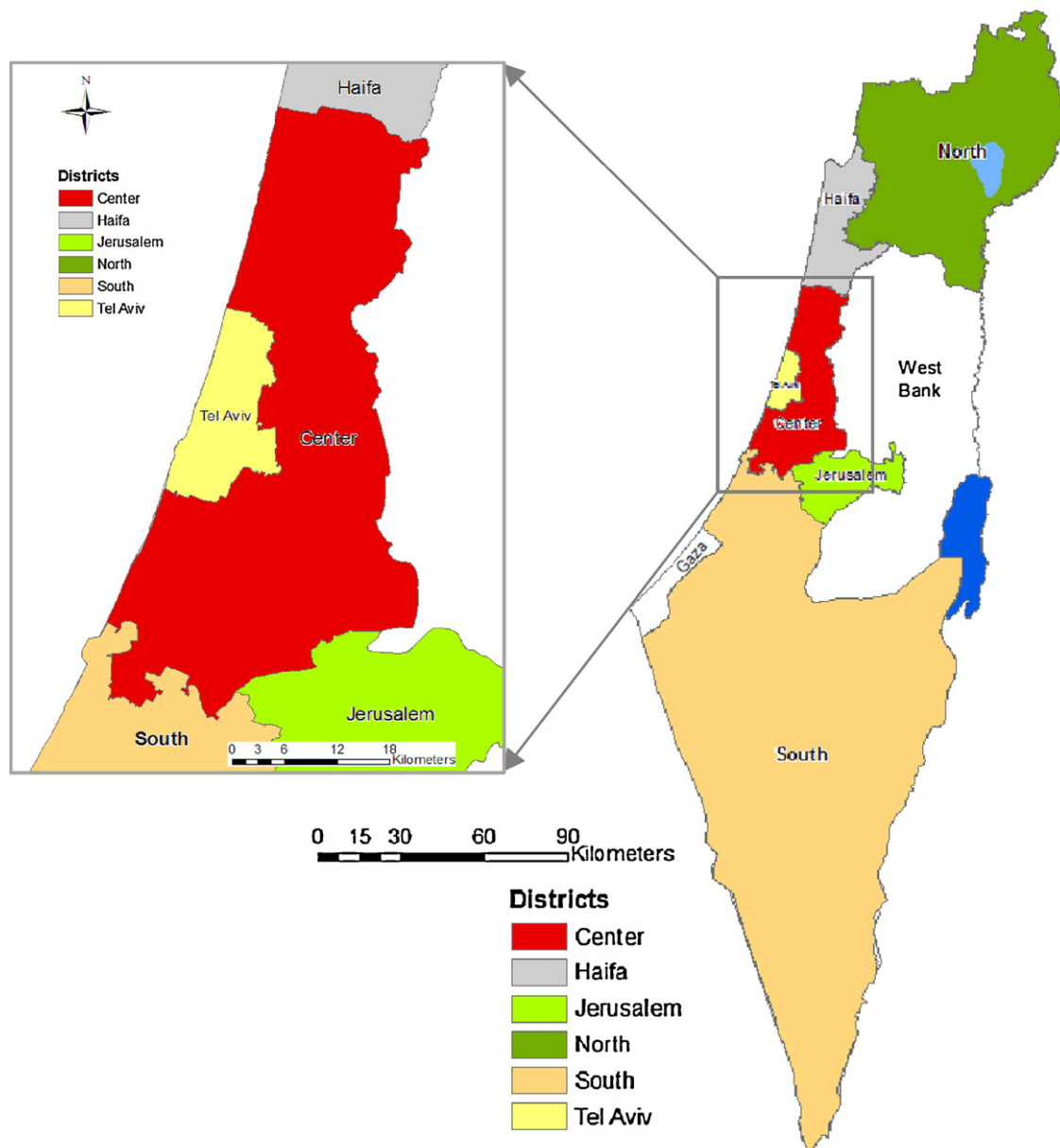


Fig. 1. Planning districts in Israel and the Central District, where the research was performed, marked by red. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

DOP3, prepared in 1980, foresaw the coming suburbanization and wished to regulate it. Authorized in 1982, this plan was designed to ensure a compact pattern of urban growth and maintain relatively high densities of residential, industrial and commercial activities. Within this framework, the associated outline plan defined a variety of land-uses, each supplemented with detailed

ordinances delineating permitted uses, for example, urban centers, residential areas, rural settlements, industrial areas, commercial nodes, roads and infrastructure, as well as prohibited uses and activities.

The plan allocated 65% of the district's area to farmland and 14% to national parks, nature reserves and forests. These preferences did not stem from the status of agriculture as the country's main economic activity or as a national asset. Rather, it reflected Israel's established farmland protection policy. As noted by Alterman (1997), Feitelson (1999), Tal (2008), and Orenstein and Hamburg (2009), the "back-to-the-land" ideology of cultivation that flourished in the pre-state era, as well as the early years that followed Israel's independence, led to defining the bulk of the country's territory as "farmland". Farmland preservation controls required that decisions regarding the reclassification of farmland for various urban and economic uses must be authorized by a national Farmland Conservation Commission (FCC), adjacent to the National Planning and Building Board. The comprehensive definition of

Table 1
Population growth in Israel's Central District.

Year	Population	Annual growth rate (%)
1948	122,000	
1961	407,000	9.7
1972	580,000	3.3
1983	831,000	3.3
1995	1,216,000	3.2
2003	1,542,100	2.3
2007	1,730,000	3.0

Table 2

Major land uses in Israel's Central District, allocated by DOP3 and DOP3/21.

Aggregated land use	Land use definitions and allocations in DOP3		Land use definitions and allocations in DOP3/21	
(1) Farmland	Agricultural land	65%	Agricultural land	45%
(2) Nature and scenic landscape	Nature reserve Scenic reserve Existing national park Proposed national park Maintained beach Forest	14%	Open landscape River and surrounding area National park Forest Nature reserve Scenic reserve	15%
(3) Urban area	High dense urban area Low dense urban area Urban center Reserve for future planning	10%	Urban development area Institution Reserve for planning Cemetery	22%
(4) Industry and commerce	Industrial area Polluting industry Postponed basin area	1.5%	Industry and employment area Secondary metropolitan employment area Engineering installation area Airport	5%
(5) Countryside	Built countryside	7.5%	Built countryside Tourism and recreation facilities	10%
Other uses	Other uses	2%	Other uses	3%
Total		100.0%		100.0%

farmland, meaning a term encompassing both agricultural land and open spaces, became problematic as pressures for redefining land-use mounted. The FCC required a more definitive tool to distinguish between low-value agricultural land and highly important open spaces. In 1996, almost fifteen years after the DOP3's preparation, Amendment no. 43 to the Planning and Building Law was the first legislation to differentiate between the two land-uses.

The implementation of DOP3 was intended for execution by the time Israel's population reached 5 million, with one million inhabitants in the Central District alone. Its planners anticipated reaching this milestone in early 2000. However, due to the unexpected wave of immigration to Israel, the maximal population level was reached by the mid-1990s (ICBS, 2000). The subsequent plan – DOP3/21 – was authorized 20 years after DOP3 and reflected the urgent need to address the rapid population growth and the consequent development that took place in the Central District. The result of this development was significant reduction of farmland (from 65% to 45%) and doubling of urban areas (from 10% to 21%) in the district (details in Table 2). DOP3/21 offered larger areas for existing cities, towns and villages, anticipating the need for further development. In addition, DOP3/21 adopted a much more flexible attitude to land-use ordinances, allowing for urban and industrial areas to grow up to 10% beyond the specified land allocation. Despite these changes, DOP3/21 hoped to promote principles of compact development and slow down the processes of suburbanization in the Central District.

Research methodology

This research utilized aerial photos covering about 10% of the district area and representing a variety of spatial conditions, in order to evaluate the impact of land-use plans on actual land-use development. The aerial photos form a selection of 12 test areas, covering urban and rural areas and representing different types of the land-uses that capture the diversity of the region. Accordingly, the settings offered by the test areas represent a variety of planning and development contexts:

- (a) Urbanization level: The test areas represent the full scale of urban-to-rural development, including large cities (Netanya and Petah-Tikva), medium-size cities (Rehovot, Kiryat Ekron and Yahud), small towns, rural areas, and suburban villages.

- (b) Ethnic distribution: Two of the test areas represent Arab towns (Tire and Qalansawe), while the rest represent settlements of various Israeli populations, mostly Jewish.
- (c) Geographical location: The test areas represent the northern, southern and eastern ends of the Central District. In addition, areas were sampled from locations near the Tel Aviv District (the metropolitan core) and from more peripheral and remote areas.
- (d) Developmental sequence: The test areas represent new cities and villages that were developed by the planning administration in recent years (Shoham), alongside the more veteran settlements that continue their growth. In addition, the sample includes rural and suburban areas that gradually expanded to become towns (Nes-Ziyyona), and others that kept their rural and suburban character (Gan-Soreq).

While previous research, such as that of Alterman and Hill (1978), needed to compile numerous detailed land-use amendments for the creation of an updated picture of the invested area, aerial photos enable a comprehensive and detailed look at the developed area.

We begin by comparing two overlapping GIS layers: the layer of planned land-uses taken from DOP3 and DOP3/21, and the layer of actual development in the 12 test areas sampled from the district map (Fig. 2).

The size of the test areas varies between 4 and 33 km², with an average area size of about 11 km². Overall, the test areas cover 133 km² and comprise of about 10% of the district's area (Fig. 2). The land-uses in the test areas were assessed for the years 1980, 1990, 2000 and 2006, thus representing Central District development from the DOP 3 plan through to the planning of the next plan, DOP 3/21, and leading to present day (Fig. 3).

The DOP3 and DOP3/21 outline plans were originally drawn on 1:50,000 scale maps. Digitized versions of the maps were used, obtained from the Planning Department of the Ministry of Interior. For the purpose of this research, the 11 land-uses employed in DOP3 and DOP3/21 were aggregated into five groups: (1) agriculture, (2) built countryside, (3) urban, (4) nature and scenic landscape, and (5) industry and commerce (Table 2).

Actual land-use for each year was estimated through the interpretation of aerial photos and orthophotos. The aerial photos

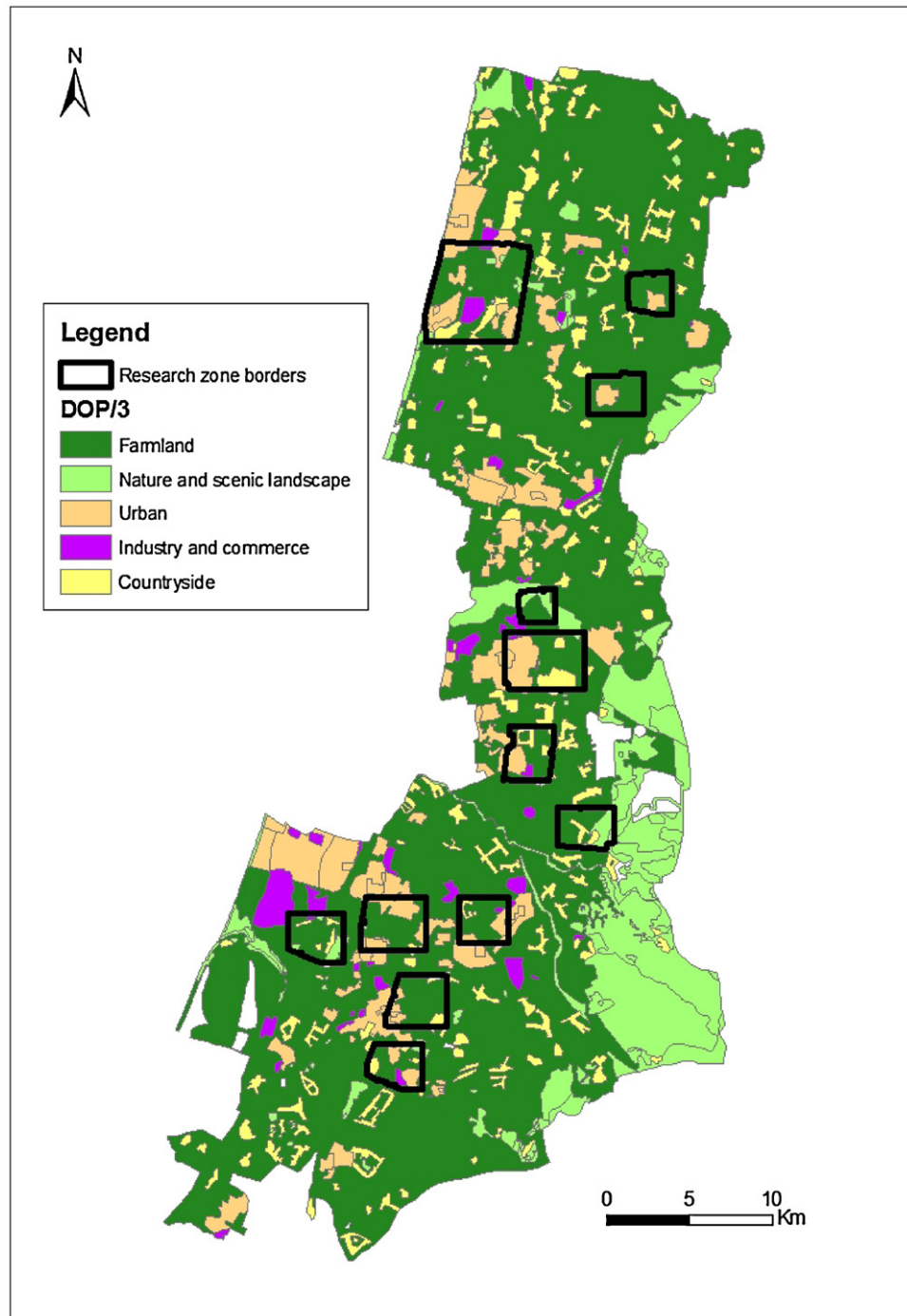


Fig. 2. DOP/3 aggregated land use categories, with the 12 research zones.

acquired were from an altitude of 5,000–20,000 m, providing resolution of 0.7 m/pixel, and were used for the interpretation of land-use in the years 1980 and 1990. Orthophotos at resolution of 0.5 m/pixel were used for the years 2000 and 2006. The aerial photos were georeferenced and geometrically corrected using GIS, based on 30 ground control points. Analysis of the aerial photos was conducted by a professional aerial photo interpreter who created polygon layers for the actual land-use for each year. The interpretation included ten land-use categories (Table 3).

The research database thus included two layers of the original outline plans DOP3 and DOP3/21, and four layers representing the actual land uses in the years 1980, 1990, 2000 and 2006.

To determine the extent to which the land-use plan was implemented we compared actual land-use with the relevant outline plan. The actual land-use layers of the years 1980, 1990 and 2000 were compared to DOP3. The year 1980 was selected to represent the base year, the year just before DOP3 was accepted; and from that point on we observed the plan's impact on actual development. The year 1990 represents ten years into the plan, when enough time had passed to show the effects of the plan on development. In 2000 DOP3 ended and DOP3/21 was approved; for this reason actual land-use during 2000 was compared to both DOP3 and DOP3/21 to observe and reflect the policy shifts between the plans. The last comparison was actual land-use during 2006,

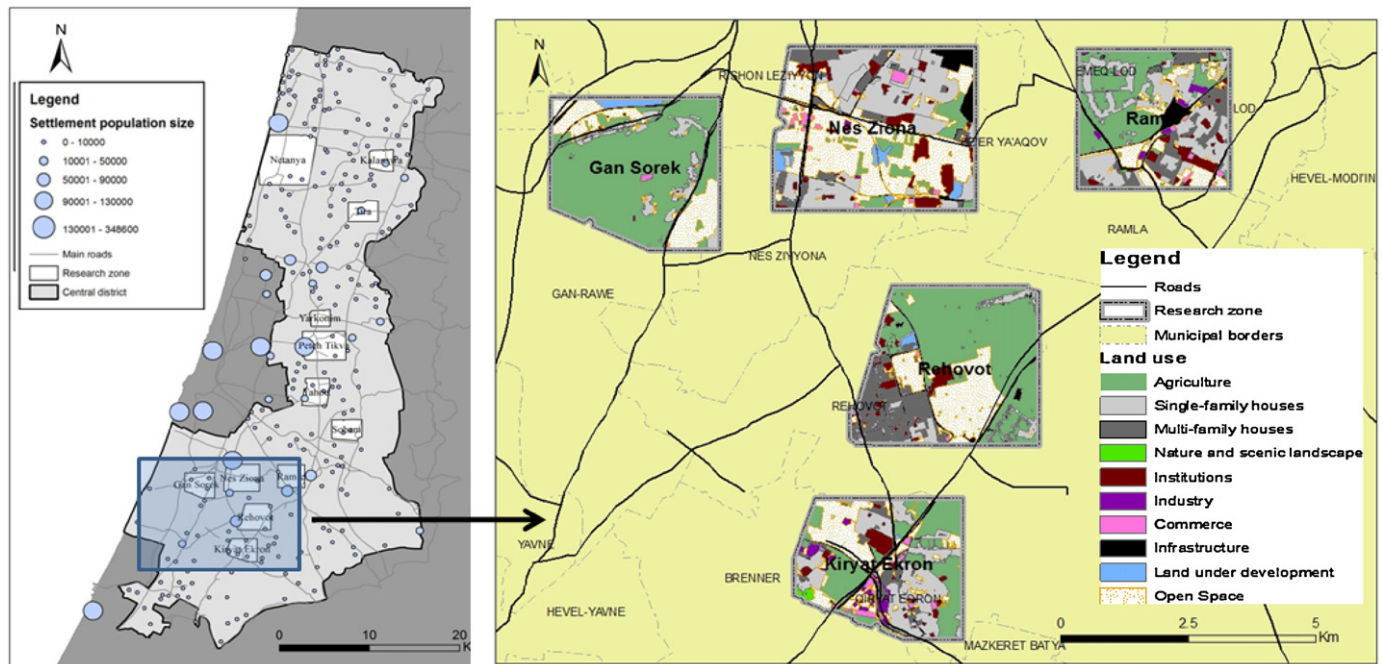


Fig. 3. The Central district with the 12 research zones and a closer view of land use at 2006 in five of them.

Table 3

Land use categories used in the aerial photo interpretation process.

Land use category	Land use included in category
1. Agriculture	Agriculture fields, greenhouses, agriculture warehouse
2. Single-family houses	Farmhouses and single family houses
3. Multi-family houses	Residential buildings, apartment buildings parking lots
4. Nature and scenic landscape	Forest and grove, archeology sites, parks
5. Institutions	Public institutions, cemetery
6. Industry	Industrial factories, workshops
7. Commerce	Commercial area, warehouses, sport and recreation centers
8. Infrastructure	Water pools, Paved roads, bus and train stations, waste disposal sites, army bases
9. Land under development	Land currently being developed
10. Open space	Fallow land, open space

subject to DOP3/21 requirements and reflecting on performance six years into implementation of the new plan.

The comparison between the plans and the actual development identifies areas of *conformance* and *nonconformance*. The *conforming areas* are those where actual land-uses adhere to the original land-use map; whereas *nonconforming areas* are those where actual land-uses do not coincide with the original land-use map. Non-conforming development is not necessarily illegal; in effect it is most probably legally authorized by planning commissions, and in many cases even initiated by national and district planning administrations that prepared new plans after 1982. This research aims at assessing the implementation of the original plans, therefore requiring an analysis of the plan's conformance and nonconformance levels.

For each of the 50 possible pairs of actual land-use and planned land-use (each of the 10 actually-developed land-uses versus the 5 originally-planned land-use categories) we determine whether the actual land-use was found conforming or nonconforming based on the plan ordinance. Table 4 presents a matrix of these land-use pairs.

As seen in Table 4, all actually-developed land-uses conform to the planned land-use category of "urban", and therefore any land-use found on a location assigned by the plan as "urban" is deemed conforming to the plan. "Open land" is considered conforming to all assigned land-uses, as it is not yet developed and therefore not nonconforming to any of the assigned land-uses. Planned land-use of the category of "nature and scenic landscape" is much more restrictive, as natural and scenic landscapes and open spaces are the only actually developed land-uses that conform to that category. Agriculture, infrastructure, institutions and all other uses are considered nonconforming to land assigned as nature and scenic landscape.

The overlap between DOP3 and DOP3/21 layers, and the layers of the actually developed land-use in the various years, was constructed with the ESRI ArcMap 9.3 GIS. The layers presenting the overlap were constructed for the actually developed layers of 1980, 1990 and 2000 subject to DOP3, and for the land-use layers of 2000 and 2006 subject to DOP3/21. Each polygon in the layers of the overlap contains attributes of the originally planned and the actually-developed land-uses and represents one of the 50 combinations shown in Table 4.

With our data we analyze the temporal changes of land-uses that were possible. This includes the shift from open spaces and nature and agricultural land-uses into one of the following land-uses: multi-family houses (MFH), industry, commerce, infrastructure, single-family houses, institutions and land under development. We did not analyze the transitions between non-built uses, such as from open space to agriculture. Applying the overlap techniques, we isolated the areas that were built between the years 1980–1990, 1990–2000 and 2000–2006 (Fig. 4).

Based on the constructed layers of spatio-temporal overlap, we calculated the percentage of development in each period and each zone in terms of conformance and nonconformance to the original plan. We were thus able to compare actual land-use development during 1980–2000 to those outlined in DOP3 and to estimate to what extent DOP3/21, the new plan that replaced DOP3 in 2002, regulated this development.

Table 4

Conformance (C) and non conformance (NC) matrix between actually developed and originally planned land use in DOP/3 and DOP/3/21.

Actual land uses	Land uses in DOP/3 and DOP/3/21				
	Industry and commerce	Nature and scenic landscape	Urban	Countryside	Farmland
Agriculture	C	NC	C	C	C
Single-family houses	NC	NC	C	C	NC
Multi-family houses	NC	NC	C	NC	NC
Nature and scenic landscape	C	C	C	C	C
Industry	C	NC	C	NC	NC
Commerce	C	NC	C	NC	NC
Infrastructure	C	NC	C	C	C
Institutions	C	NC	C	C	NC
Land under development	C	NC	C	C	NC
Open land	C	C	C	C	C

Table 5

Overall conforming and nonconforming developed areas (hectares) and their percentage, by initial year (1980) and during the investigated periods.

	1980	1980–1990	1990–2000	2000–2006
Conforming development (ha), and percentage of total	2890 (85%)	522 (48%)	362 (35%)	1016 (86%)
Non conforming development (ha), and percentage of total	523 (15%)	565 (52%)	665 (65%)	170 (14%)
Total development (ha)	3413	1087	1027	1186

Findings

Conformance and nonconformance to the DOPs

The degree to which actual development was restricted by the original land-use maps of DOP3 and DOP3/21 reflects the efficacy of this planning tool. The conformance to the DOPs is therefore presented from several points of view.

Overall development versus DOP3

As early as 1980, just before DOP3 was authorized, 15% of overall developed areas did not conform to the original DOP3 land-use map (Table 5). This nonconformance may have been caused by the extended period of plan preparation that predated DOP3's land-use maps. Our evaluation accounts for this initial nonconformance and investigates the plan's influence from that point on.

At the aggregate level, more than half (52%) of the areas developed throughout 1980–1990 did not conform to the original DOP3 land-use map (Table 5). Over the years 1990–2000, nonconformance was even higher, reaching 65% of the newly developed areas. The introduction of DOP3/21 abruptly increased the level of conformance: over 2000–2006, only 14% of the developed areas did not conform to the DOP3/21 land-use map. Note that this comparison relates to four years only, since DOP3/21 was authorized in 2002.

The largest land-use type nonconforming to the original plan is residential; the two types of residential land-uses, taken together, comprise of 77% and 75% of the nonconforming land -uses developed in 1980–1990 and 1990–2000 respectively (Fig. 5), and decreases to 52% in the DOP3/21. Note, that the fraction of non-conforming single-family houses increases in time from 27% in 1980–1990 to 39% in 1990–2000, and 49% in 2000–2006. Non-conforming industry and commerce land-uses do not change significantly in time and comprise of 11%, 13% and 16% respectively.

Spatial variability of conformance to the DOPs

Fig. 6 shows the amount and percentage of planned land-uses that were used for nonconforming development in every research zone during 1980–1990. Nonconforming development (52%, as shown in Table 5) varies greatly by zones, from 13% in Petah Tiqwa to 86% in Shoham. Note that nonconforming development occurs in the early stages of implementation, indicating that development in most of the research zones did not follow the original DOP3 land-use map and probably required the modification of the map in the

district planning and building commission, as well as the national planning and building board. The highest level of nonconformance occurred in Shoham – a new town at the eastern end of the Central District. The decision to construct Shoham just within the area allocated by DOP3 for “nature and scenic landscape” was made a few years after the authorization of the plan.

In the Neue Yaraq zone, where craft, industry, and commerce developed on agricultural land around a major road intersection, 82% of development in the years 1980–1990 did not conform to the original DOP3 map (Fig. 6).

The increase of nonconforming development occurring in the period of 1990–2000 is characteristic of all the research zones, with the exception of Neue Yaraq which had a 5% decrease (from 82% to 77%, Fig. 7). Shoham is still the leader in terms of nonconforming development (90%), followed by the two Arab towns of Tire and Qalansawe, and the urban zones of Rehovot and Ramle, with more than 70% of nonconforming development in each, mostly caused by residential developed on land that was originally allocated by DOP3 for farmland (Fig. 7).

Non-conforming land-uses

During the entire research period, nonconforming development occurred on similar land-uses. Both in 1980–1990 and in 1990–2000, most of the nonconforming development that took place on land originally allocated for farmland (Figs. 6 and 7). Land allocated for farmland thus appears to serve as a buffer, an inventory for development rather than actually designated for cultivation. Actual development on land designated for nature and scenic land-uses is less prevalent; however the new town of Shoham is built on land originally allocated for nature and scenic land-use, with full permission of the district as well as the various national planning commissions.

Overall development versus DOP3/21

As mentioned previously, the DOP3/21 of 2002 abruptly incorporated the majority of actually developed areas into the comprehensive land-use map. In addition, DOP3/21 offered new opportunities for developed land-uses, although not enough time has elapsed to examine in detail the conformance of actual development to this new plan. Nevertheless, the relatively short period of time in the years 2000–2006 already reveals significant rates of nonconforming development in some of the research areas (Fig. 8). This is the case for the Arab villages of Tire and Qalansawe, with

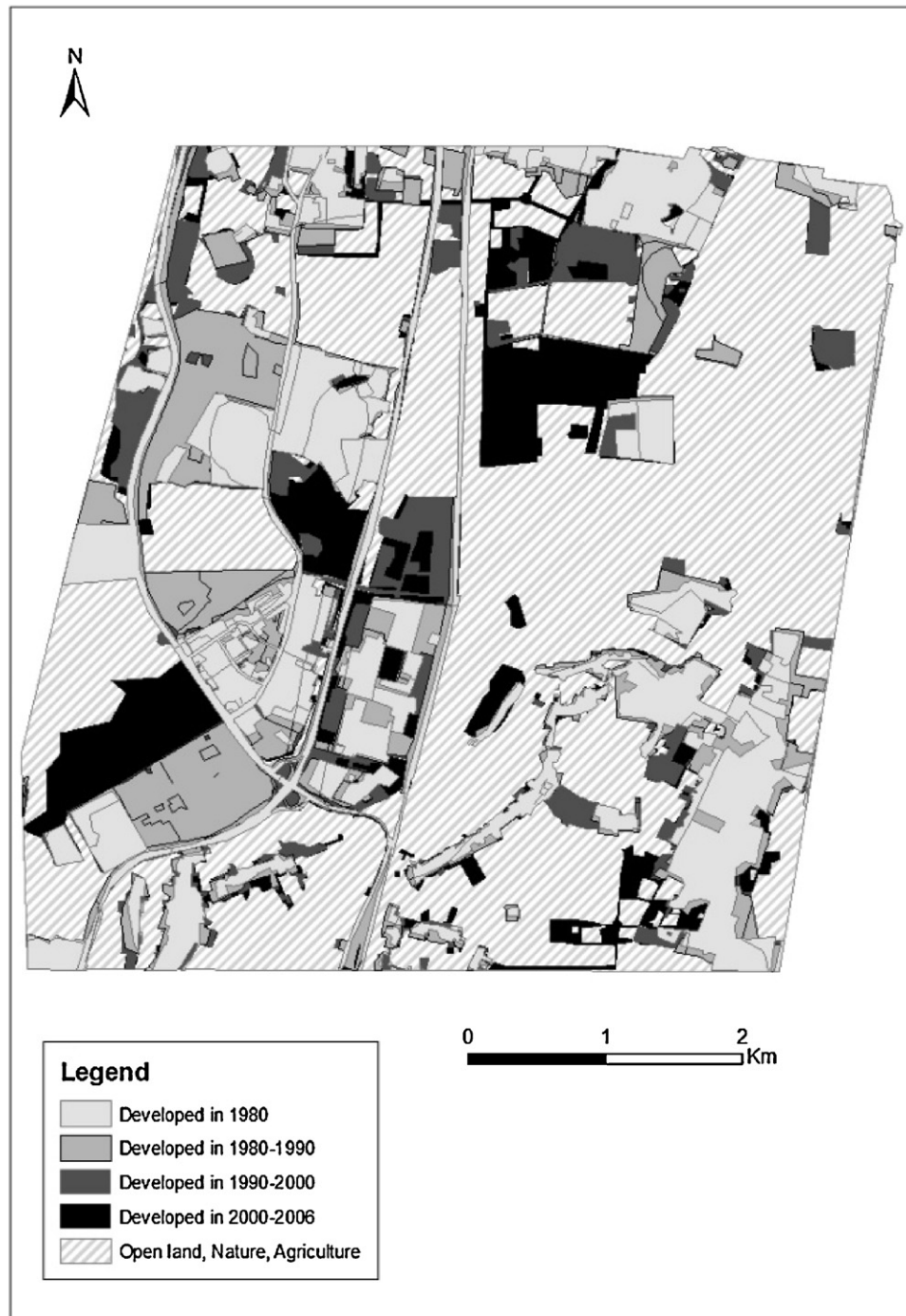


Fig. 4. A temporal look at the actual development in Netanya zone.

approximately 30% of the new development there found to be non-conforming to the recently authorized plan. This is also the case in the urban area of Petach-Tikva, where the development not conforming to the original land-use map is nearly 50 ha, 31% of the total development in the research zone. In four of the remaining nine zones – Kiryat Ekron, Yahud, Ramle and Gan Sorek the non-conformance have already reached the level of 12–17%. As before, most of the nonconforming development occurs on land originally designated as farmland (Fig. 8). The massive nonconforming development taking place in Petach Tikva, however, occurs on land allocated for nature and scenic land-use, and this is also the case with the continuous illegal development occurring in Newe Yaraq.

The utilization of land-uses allocated by the DOP3

To estimate the original plan's role in directing actual development to specific locations, we compared the amount of nonconforming land-uses to the available land that was allocated by the plan for the same uses. If the land-use map was effectively used for directing actual development, then land allocated by the plan for specific land-uses would have been utilized *before* the development of these specific land-uses expanded to other areas. Conversely, if actual development systematically deviated from the original outline despite availability of land in proximate locations, then the original plan is indeed ineffective as a directing tool.

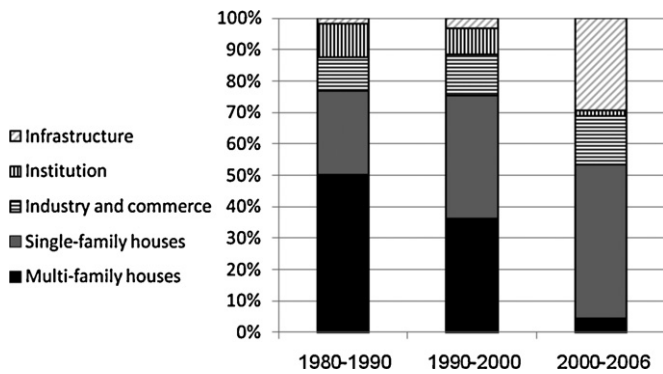


Fig. 5. Distribution of nonconforming land uses during the periods.

The ratio of vacant land-uses in the original map of DOP3 at the end of each period to the nonconforming development of the same type in every research zone is presented in Fig. 9. Already in the first period of 1980–1990, nonconforming development of multi-family housing took place in 8 of the 12 areas despite there being sufficient areas (ratio ≥ 1) available for these uses within the original map of the DOP3 (Fig. 9a). This was also the case with single-family housing, as nonconforming development took place in 7 areas although sufficient areas for these uses were available in DOP3 (Fig. 9b). Similarly, the development of industry and commerce did not use sufficient available resources allocated in 6 of the 12 test areas (Fig. 9c). During 1990–2000 the situation did not change. Nonconforming development occurs in all land-use types despite unused land resources in DOP3 (Fig. 9).

The effect of actual development on shaping future land-use plans

The last question to be answered is: Did the plan's comprehensive updated version, DOP3/21, authorized in early 2000, account for the aberrations and adopt the reality of actual land-use? Replacing DOP3, DOP3/21 was officially authorized in 2002 as the new Central District plan. The new plan doubled the amount of land allocated for development in the Central District, from 19% in DOP3

to 37% in DOP3/21, with the goal of addressing future population growth and increased standard of living.

To test the influence of the DOP3/21 land-use map on actual development, we compared the conformance of the actually developed land-use to the original land-use maps of DOP/3, and to the land-use maps of DOP3/21.

During 1980–2000, developed land across the test areas grew by 64%, expanding from 34.0 km² to 55.3 km². A significant area (60%) of the increase (12.0 of 21.3 km²) did not conform to the original land-use map of DOP/3 in 2000. However, the land-use map of DOP3/21 almost perfectly conforms to actual development; the main exception is the illegal node of industry and commerce in the Newe Yaraq area (Fig. 8). That is, with the exclusion of Newe Yaraq, DOP3/21 adopted actual land-use development of the last 20 years in all the test areas and included it into the land-use map.

Discussion

The authorization of a comprehensive land-use plan is the result of mutual effort by planners, decision makers and public organizations, who study, deliberate and attempt to predict the necessary direction of future development. Once authorized, the land-use map and ordinances form the planning regulations intended to instruct all civilians and stakeholders regarding legal land-use. The amendment of a district plan also requires institutional resources invested by the local and the district commissions in addition to the approval of the national planning and building board. But what is the value of the statutory land-use map in real life? Does it actually direct development or is it merely a starting point for incremental, spot-oriented regulation processes that dim the comprehensive perspective? And if this is the case, why not concentrate on developing guidelines for incremental decision-making and forsake the comprehensive land-use map?

Our study of the performance of the original land-use maps DOP3 and DOP3/21, Israel's land-use plans for the Central District, proves that comprehensive land-use maps are ineffective in terms of guiding the development of large and complex environments. In line with Booth's (1996, 2003) claims, it appears that the development of Israel's Central District is not directed by the comprehensive land-use plan but rather by local

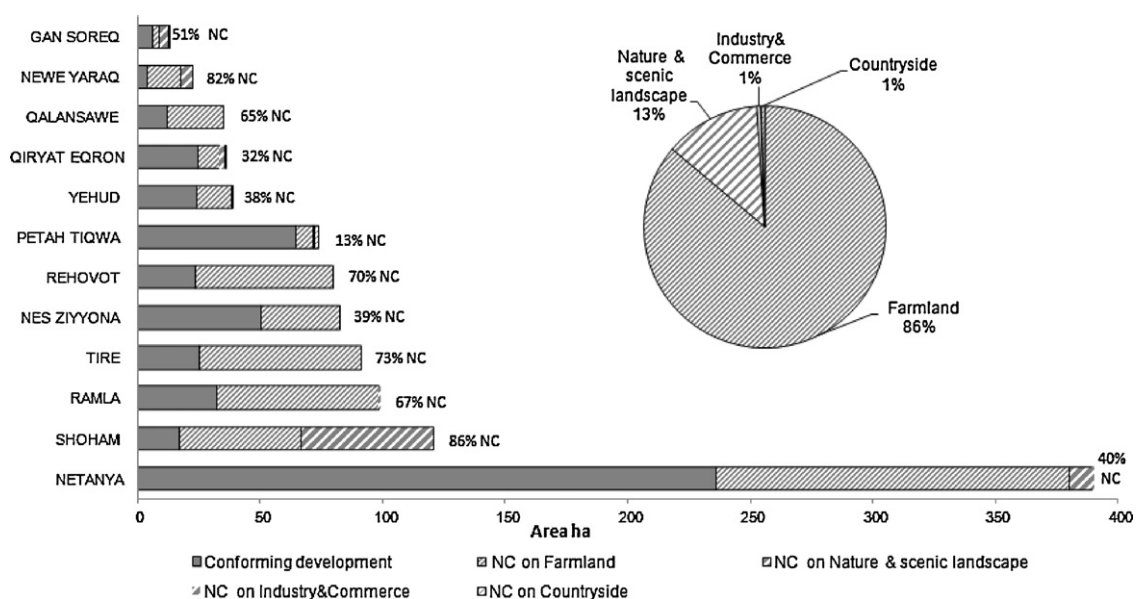


Fig. 6. Amount of area (hectares) developed in conformance and nonconformance (NC) to DOP3 by research zones, and the types of land uses in DOP3 that are utilized by nonconforming development, 1980–1990. Numbers next to the bar refer to the percentage of nonconforming development in the area. Pie chart shows the overall distribution of planned land uses utilized by NC development.

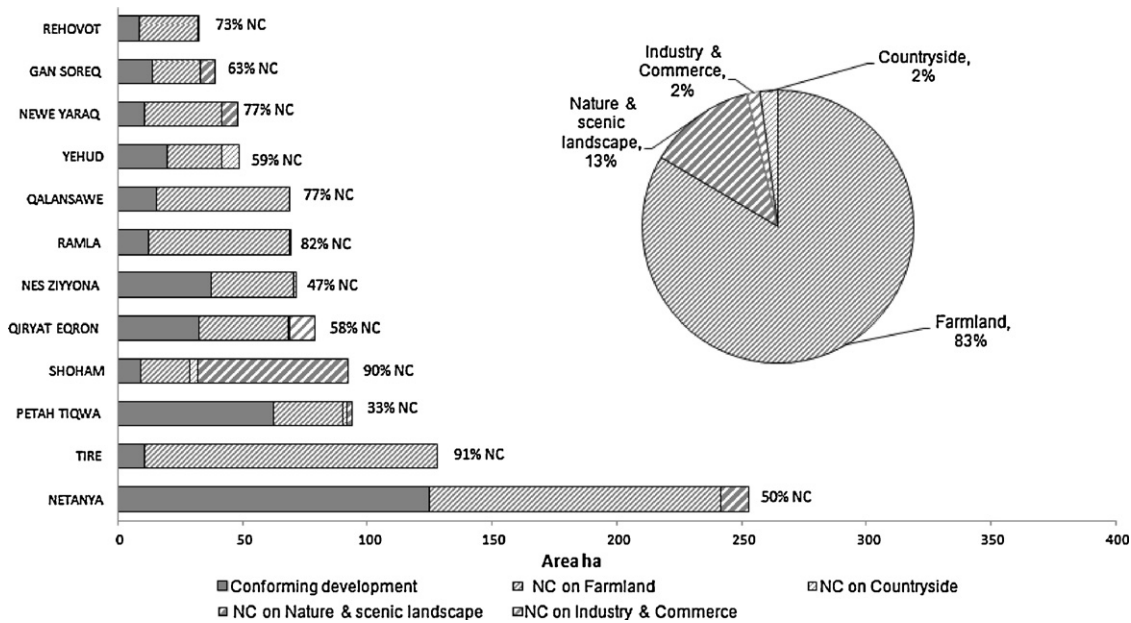


Fig. 7. Amount of area (hectares) developed in conformance and nonconformance (NC) to DOP3 by research zones, and the types of land uses in DOP3 that are utilized by nonconforming development, 1990–2000. Numbers next to the bar refer to the percentage of nonconforming development in the area. Pie chart shows the overall distribution of planned land uses utilized by NC development.

amendments to the plan performed gradually on a case-by-case basis.

Several research findings should be highlighted. First, findings reveal that in the majority of test zones actual development is not restricted by the definitions outlined in the original land-use plan. The actual case-by-case development gradually erodes land-uses

originally allocated for farmland and for nature and scenic landscape, turning them into built areas. Land designated by the initial plan as “farmland”, and composing 65% of the Central District, is actually being used as reserve land. In most of the research zones farmland was used for development of residential units and industry and commerce. The actual development on farmland started

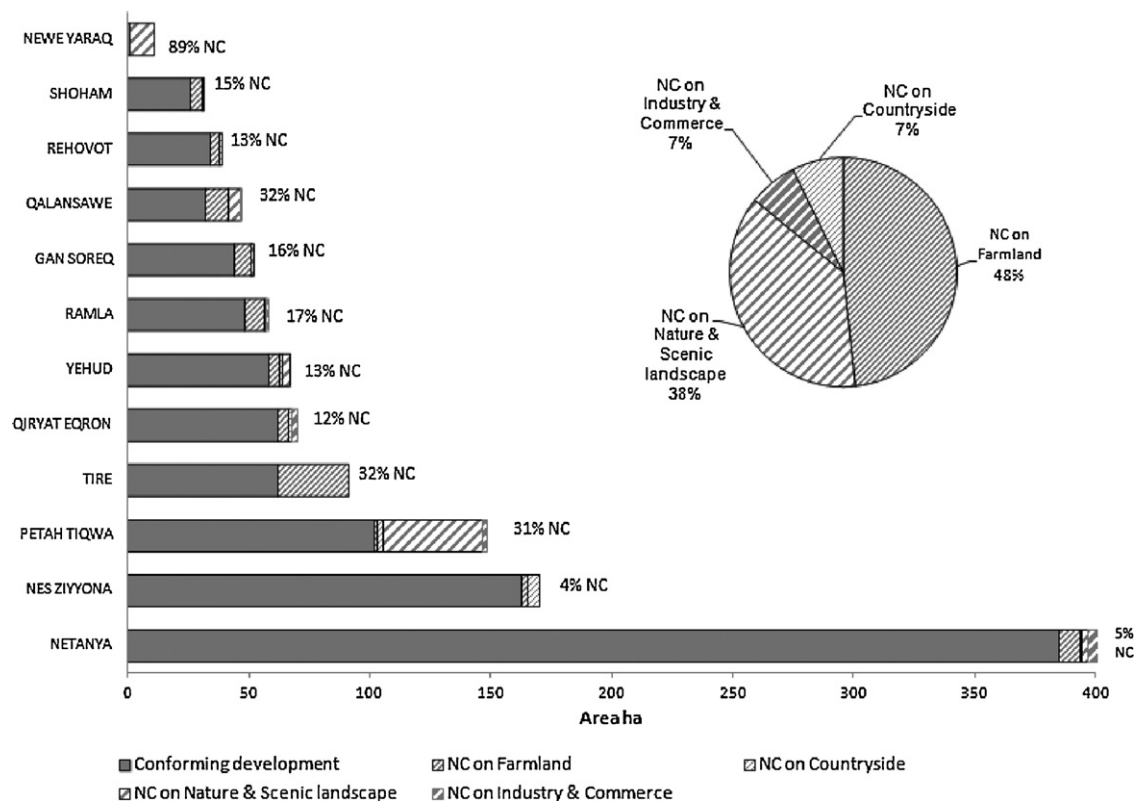


Fig. 8. Amount of area (hectares) developed in conformance and nonconformance (NC) to DOP3/21 by research zones, and the types of land uses in DOP3/21 that are utilized by nonconforming development, 2000–2006. Numbers next to the bar refer to the percentage of nonconforming development in the area. Pie chart shows the overall distribution of planned land uses utilized by NC development.

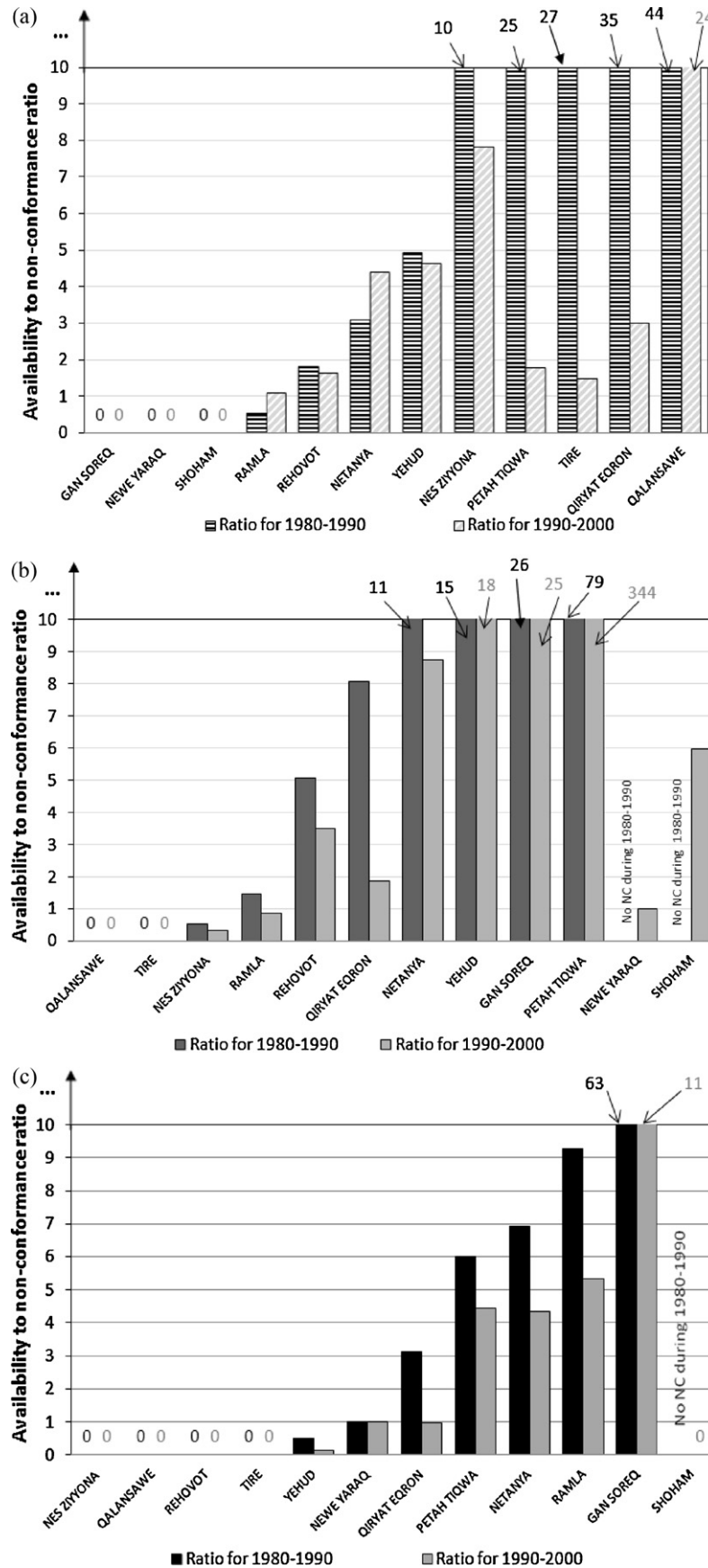


Fig. 9. Ratio of the available planned area in DOP3 at the end of the ten-year period to area of nonconforming (NC) development that took place during that period. The ratio is specified above bar when it is 10 or more. (a) Available area of planned urban to NC area of multi-family housing and land under development. (b) Available area of planned countryside to NC area of single-family housing. (c) Available area of planned industry and commerce to NC area of industry and commerce.

immediately after the authorization of DOP3 and took place in the 1980s and in the 1990s. Though the pace of converting farmland into built areas slowed down after the authorization of DOP3/21, this study found it continued at lower level in the years 2000–2006.

The ineffectiveness of the original land-use plan, designed to restrict development in specific locations, appears to be exacerbated by the approach of the planning authorities. One example of this is the development of the new town of Shoham on land originally allocated to nature and scenic landscape but authorized by the Israeli National Planning and Building Board. In addition, residential development on farmland on the outskirts of Netanya and Petach Tikva, two large cities, was authorized by local and district planning commissions. It is safe to assume that most nonconforming development was legally authorized, except in the case of Newe Yaraq, where the district commission deemed the development illegal and building permits were never authorized. While constantly increasing nonconformance appears to contradict the articulated logic of the regulatory planning system, it nevertheless occurs in all the test zones, affecting development of the built environment more than the original plan.

The erosion of original land-use allocation appears as a continuous pattern, taking place throughout the research period. Since our analysis regarding the performance of DOP3/21 is limited to the years 2000–2006, we looked at the amendments made by the planning authorities to this plan. Note that DOP3/21 substantially reduced the amount of land allocated for agriculture and open spaces, and incorporated flexibility tools into the plan's resolutions. Nevertheless, in roughly 9 years, beginning with the plan's authorization in 2002 until December 2010, 26 official amendments to the plan were authorized. Most of the amendments changed the original land-use map, and a few even made considerable changes in the form of new settlements and vast expansion of towns. As noted above, this was also the case with DOP4/14, the comprehensive land-use plan for the Southern District authorized in 2000. More than 75 local amendments had been authorized for DOP4/14 forming major changes to the original land-use map, including the establishment of new towns and villages in open spaces. It appears that despite the vast effort and time invested in preparing and authorizing district land-use maps, this is not an efficient planning tool in terms of restricting development in specific locations.

The second finding raises doubts regarding the degree to which the original land-use map effectually contributed to guiding the actual pattern of development. Doubts are raised in regards to the efficacy of the plan, as in all test areas nonconforming development took place while land allocated for the same uses was never fully utilized. In other words, while land allocated by the plan for specific uses remained unutilized, the same specific uses were built on lands allocated to other uses. The zones of Netanya and the Arab towns of Tire and Qalanswa represent two different examples of the development that does not follow the original plans. In Tire and Qalanswa an extended single-family houses (SFH) construction took place despite no allocation of land for this purpose by the original DOP3 plan. In the case of Netanya, extensive areas were allocated for multi-family houses (MFH) by the original DOP3 plan, yet considerable development of MFH took place on lands originally planned for farmland, meanwhile 3–4.5 times larger area originally allocated by the DOP3 for residential uses remained undeveloped (Fig. 9a). The same is true in regard to the development of industry and commerce. Our research shows that these are not exceptions to the rule, but rather a prevalent and reoccurring pattern in almost all test areas.

Deviations from original plan-specified locations and the decision to proceed with new, nonconforming development may result from various local reasons, such as entrepreneurial opportunities and legal issues relating to land ownership. Most of the nonconforming development seems to be legally authorized, clearly

indicating that local and district planning authorities do not insist on following the guidance of the original land use map.

The third finding relates to the incorporation of the gradual nonconforming development, occurring in the years 1980–2000 and into the new DOP3/21 outline. This indicates that despite nonconformance to the original DOP3 map, actual development was nevertheless accepted by the planning authorities. The finding exposes the planning and development pattern that takes place in Israel's Central District: instead of directing development of the built environment, restricting development from specific locations and guiding it to other places, the statutory land-use plan is marginalized by the case-by-case dynamics of actual construction. This is a realistic and expected way of development, but it completely contradicts the pattern of statutory planning and development articulated by the planning administration.

The coming reform in the Israeli planning system, and particularly the absorption of the district plans "upwards" into the national outline plans, and "downwards" into the local outline plans, can therefore be seen as an opportunity to develop new and more effective planning tools. Instead of investing vast efforts in the creation and authorization of district land-use plans, which have limited impact on actual development, more effectual planning tools may now emerge. The required reform, however, is not merely technical. It embodies a shift in the understanding of long-term planning, its role, powers and also limitations. These issues are discussed in the next section.

Concluding remarks

As noted above, the legitimacy of statutory, long term planning stems from its role in securing public interests and safeguarding public assets. Preparing and authorizing land-use plans was, therefore, meant to secure specific values and ensure that development follows a certain path to match with the interests of the public. However, the fact is that since the early 1980s and in a prevalent and legal procedure, the original, comprehensive land-use map was amended by bottom-up initiatives. More than 50% of the development in the Central District did not conform to the original outline, and this pattern of planning reoccurs in other district outline plans and with respect to DOPs that were authorized after 2000. The emerging question is: How can this pattern of planning and development be seen as protecting the public interest, which is a fundamental value for legitimizing statutory planning?

The answer to this question may be found in ideas presented above of land-use regulations that are not map-dependent. To be effectual, the frames offered by Duany and Talen (2002a,b), as well as Alfasi and Portugali (2007, 2009), emphasize qualitative aspects of development rather than suggest the location of specific land-uses. Duany and Talen (2002a,b) present the American Smart Code and the Transect System as vision-based tools for evaluating development on a case-by-case basis. The idea is to code values of urbanism and environmentalism into clear and practicable decision-making principles that are not map-dependent. Sensitivity to the specific location of the built element – whether in the city hub or on the fringe – is managed by the Transect System; that is, dividing the planned area into discrete environments and creating a set of relevant principles to each one. While the codes are comprehensive in nature, considering interrelations between social, economic and geographical factors and embodying a wide range of scales – from the building, lot and neighborhood to the city and region – they are nevertheless specific and technically worded.

Similarly, Alfasi and Portugali's Urban Code is a map-free set of principles for evaluating local plans. They suggest to articulate an urban code by an elected legislature, and, in parallel, to preserve a separate planning judiciary that weighs and authorizes the bottom-up flux of plans offered by public and private planning agencies. The

separation of authorities aims at constructing democratic decision-making machinery for the non-mapped planning regulations, thus ensuring the subjection of local plans to comprehensive considerations. The articulation and publicity of the rules is intended to create a public discourse on planning issues that would enable their periodic amendment and enhancement.

Finally, when used properly, land-use maps could serve for protecting specific open spaces. In order for actual open spaces to be protected from development, land-use plans should indicate which areas are deemed “not-for-development” but refrain from using this definition only for creating land reserves for future development. By using the qualitative principles for directing development and indicating open spaces and nature reserves on the map, one could better create and protect these areas.

Apparently, the potential advantage of non map-dependent regulation is becoming recognized in Israel. The National Outline Plan 35 (NOP35) authorized in 2002 introduced a new vocabulary to the planning system, with the intention of developing decision-making criteria that are not zone specific. NOP35 divided the entire country into five *planning textures* – urban, rural, national-preserved, mixed-preserved and coastal – each given a set of rules regarding development. These non-geographical rules include a handful of essential yet practicable planning principles to match with the general qualities of the natural and built environment, similarly to the rationale of the Transect System of Duany and Talen (2002a,b). The rules are directed at decision-makers in the local and the district planning commissions and are intended to guide them as well as to limit them when evaluating plans on a case-by-case basis. Israel's Central District, for example, is mostly made of urban and rural textures. The relevant planning principles direct new residential development to lands that are adjacent to already developed areas; limit low-rise residential development to rural villages; and condition new residential and employment development on compatible development of public transportation.

While the performance of NOP35 has not yet been assessed, it appears that converting the district outline plans into planning principles could offer a more stable frame for planning decision-making. The coming reform still needs to ensure the ratification of the planning principles by the local and district planning commissions for better protection of the public's interests.

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