

Environmental Implications of Land Use - Transport Policy Packages in the West Bank and Israel

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Introduction

This paper draws on the work of a collaborative multidisciplinary team of Israeli, Palestinian and German researchers, and presents an overview of the methodology and approach and a status report on the team's progress and issues encountered in developing forecasts of the environmental effects of alternative land use and transport policies in Palestinian and Israeli areas. The research is funded by a grant from the DFG German Scientific Research Fund. (Opinions expressed are those of the author, and do not necessarily represent those of other project team members or the funding agency.)

This paper presents a snapshot of work in progress, and structured as follows:

- Overview of the transport planning problem.
- Modeling issues and approach.

Overview of the Transport Planning Problem

Historically, on the West Bank of the Jordan River, transport and environmental planning has taken a back seat to issues of international political concern. Now, as Israel and her neighbors take steps towards peace in the region, the prospect of stability makes planning a realistic aspiration; the promise of economic development demands the dismantling of physical and political roadblocks to orderly growth and efficient movement of people and goods.

Forecasts of population for Israel and Palestinian areas show rapid growth from 7.5 million persons today to over 12 million by the year 2020 (see Table 1). Vehicle availability will increase from an average 150-250 vehicles per 1000 residents today to 350-500 under various future scenarios. Diesel vehicles (which include public transport buses) account for up to 20% of the vehicle fleet, but are responsible for over 80% of the most problematic air pollutants. Current political and security considerations hinder in different ways the free movement of major population groups in the region. These issues affect travel demand, network continuity/capacity and ultimately system performance within a transport model.

Modeling Issues and Approach

To address the transport planning issues cited above, the research team requires appropriate tools for analysis and forecasting. The research team selected emme2 as the transportation modeling package, and is currently calibrating a model which will subsequently be used for forecasting and analysis. Major model development issues include the following:

- Integration of emme2 into a geographic information system (GIS) for the development of land use and transport network databases under conditions of rapid growth, limited data availability, political tensions, multiple data sources and interests, areas of extreme topography and other network limitations. Additionally, the GIS would be used for the analysis and display of air quality and other environmental effects of alternative policy scenarios.

- Development of a modeling approach and tools for assessing effects of policy packages regarding security checkpoints, work permits, bypass roads and informal park-n-ride sites on travel demand matrices and mode and path selection. A sampling of the range of policies being considered for testing as part of the research is presented in Tables 2-3.

These modeling issues are being addressed as follows:

- As part of the project work program, a software package has been developed by the researchers from the University of Dortmund which provides a relatively seamless interface between emme2 and ArcInfo GIS, such that all network manipulations, display and analysis can be performed in the GIS in the context of other relevant databases as discussed below.

- The project must take into account the severe topography of the eastern slopes of the West Bank area in the development of proposed transport networks. This will be accomplished through the integration of the network editing into the ArcInfo GIS, as discussed above. Topographic data which have been compiled by the Palestinian researchers will be depicted as link attributes for slope, to allow for the incorporation of this additional factor in the calculation of initial speeds and roadway capacity.
- A key objective of the research project is to assess the linkage between land use - transport policy packages and the balance between EquityùEfficiencyùEnvironmentaláQuality (a paradigm developed by the Dortmund researchers). A major source of information on the efficiency effects of alternative policy packages is set of summary reports of transport system performance (VKT, VHT, Delay, Speeds, etc.) which the Israeli team has automated for presentation and comparison by district, by type of facility, etc.
- Equity and efficiency effects of alternative policies regarding constraints on the free movement of population groups (for instance at security checkpoints and on bypass roads) will be assessed through the development of separate trip matrices for the various population groups and network constraints similar to the approach typically applied in the modeling of carpool (HOV) lane restrictions.
- Equity and environmental quality effects will be analyzed through the GIS: Land use and land form data compiled from satellite images by the researchers from University of Bonn and Vechta University will allow for market segmentation of travel demand to be correlated with population groups and planned development patterns; air emissions from the transport model are being gridded (rasterized) and run through a set of models developed by the Israeli researchers for regional air pollutant dispersion and reaction across the project area airsheds.

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