

**The Jerusalem Institute for Israel Studies
The Center for Environmental Policy**

Environment and Policy

Environmental Policy Research Collection

Editors:

Amir Eidelman

Alon Tal

Nir Ben-Aharon

2002

The Jerusalem Institute for Israel Studie
The Center for Environmental Policy
Research Series No. 3

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This book was made possible by funds granted by the Charles H. Revson
Foundation.

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ISSN 033-8681

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The Hay Elyachar House
20 Radak St., 92186 Jerusalem

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ABOUT THE AUTHORS

Shaul Arlosoroff – Water Engineer. Chairman of the Israeli Association of Water Engineers and Senior Consultant regarding Water resources Management.

Nir Ben-Aharon – Doctoral candidate at the Hebrew University in Jerusalem. Researcher at the Jerusalem Institute for Israel Studies, and a coordinator of the *NITSOS* program, the industrial innovation program of the Ministry of Industry and Trade.

Nir Becker – Ph.D. in Economics. Head of the Department of Economics and Management in Tel-Hai College and Senior Research Fellow at the Center for Natural Resources and Environmental Research, Haifa University.

Amir Eidelman – Ph.D. in Geology. Head of the Center for Environmental Policy in the Jerusalem Institute for Israel Studies.

Eran Feitelson – Ph.D. in Geography. Senior Lecturer in the Geography Department, the Hebrew University, Chairman of the Council of National Parks and Nature Reserves.

Noam Gressel – Ph.D. in Environmental Science and Policy. Founder of *Assif-Strategies* – Environmental Initiatives & Development. Lecturer, the Arava Institute for Environmental Studies.

Doron Lavee – Doctoral candidate at Ben-Gurion University in Economics. Co-Director, *Pareto*, Economic Consultants.

Chen Levin – B.A. in International Relations and M.A. Student in Management. Member of the Industrial Development Policy group, Jerusalem Institute for Israel Studies.

Orit Marom-Albeck – B.A. in Chemistry and M.A. Student in Law studies. Specializes in Environmental Law and Researcher in Environmental Quality. Attorney in *Albeck-Efroni* Law Office, Arbitrator and Lecturer in Environmental Law.

Nir Papay – M.A. in Geography with expertise in urban and regional studies, planning and environmental policy. Coordinates Coastal and Marine Issues in the Environment and Nature Protection Branch in the Society for Protection of Nature in Israel.

Alon Tal – Attorney and Ph.D. in Environmental Policy. Head of the Environmental Policy Center, the Arava Institute for Environmental Studies, Chair of Life and Environment, Umbrella Group for seventy environmental organizations.

Dorit Talitman – Attorney and Ph.D. Student in Geography at Tel Aviv University. Researcher in environmental enforcement at the Arava Institute for Environmental Studies.

Menachem Zalutzki – M.A. in Geography with expertise in urban and regional studies. Heads the division of the Open Spaces at the Ministry of the Environment.

INTRODUCTION

The formulation of environmental policy requires a multidisciplinary approach combining knowledge in the natural sciences, medicine, the social sciences, and the humanities, as well as expertise about the judicial and governmental systems in Israel. The goal of such policy is to create an environment that is healthy, stable, balanced, and sustainable for this generation and the generations to come. A research infrastructure based on an understanding of both natural and man-made (anthropogenic) processes deepens existing knowledge, develops new ideas, and makes it possible to critique the existing situation based on solid evidence. The aspiration is that the findings and conclusions of policy studies will be translated into legislation, regulations, work procedures, and a series of recommendations with regard to managing the resources of the environment and developing environmental-friendly technologies.

The past twenty years have seen an increasing awareness in the Western world of the need to preserve the environment. The demographic surge and the rise in the standard of living have brought with them hyper-exploitation of natural resources and a concomitant increase in ecological hazards. Awareness of environmental issues and recognition of their importance are now high on the public agenda. In many countries, environmental policy is developing within governmental and public bodies, while academic institutions are engaged in applied research in the realm of the environment.

In Israel, the Ministry of the Environment has invested considerable resources in the creation of a policy and planning "cluster," which is intended to formulate and implement environmental policy. In the public sphere, extensive environmental activity has existed in Israel from the 1950s, when the Society for the Preservation of Nature was founded, to the present day, when a broad range of environmental

organizations are active, such as the Israel Union for Environmental Defense, and Life and Environment, the umbrella organization of the green organizations. The institutions of higher learning in Israel have recently created environmental study tracks, which conduct research and other activity in areas of applied knowledge. The welcome activity in the sphere of environmental policy in Israel attests to a greater awareness of environmental issues that has evolved over the years; nevertheless, major tasks still lie ahead of us, which call for a more coherent environmental policy.

The environmental policy centers at the Jerusalem Institute for Israel Studies and at the Arava Institute for the Study of the Environment were established with the support of the Charles H. Revson Foundation in New York. These centers have set themselves the goal of conducting research that will create a foundation for the formulation of environmental policy that is geared to Israel's needs and of helping governmental and green bodies to implement recommendations.

This book contains a number of studies that were conducted in the sphere of environmental policy in 1999-2000. It is divided into three sections:

- ◆ Environmental enforcement
- ◆ Infrastructures and water resources
- ◆ National environmental challenges

The articles and studies that follow reflect the current state of affairs in major issues relating to the environmental situation in Israel, and they include data and concrete recommendations.

It is our hope that this book will become a reader that will serve as a platform for researchers in the realm of environmental policy and as a source of information for government officials and members of the general public who are engaged in shaping environmental policy in Israel.

The Editors

ABSTRACTS

*Assessing the Benefits of Noncompliance:
The Role of Economic Analysis in Environmental Enforcement*
Alon Tal

Although the "polluter pays" principle remains an ostensible centerpiece of Israeli environmental policy, empirical evidence shows that in practice, in Israel, it pays to pollute. The research opens with an evaluation of prosecution data during the past four years, showing that of the 100 non-marine environmental cases that ultimately made it to court, over 70 percent resulted in fines below NIS 10,000 NIS. The lack of economic deterrence may thus be one of the primary reasons for Israel's poor environmental performance.

This problem is not unique to Israel and has been addressed in a number of jurisdictions. The United States was the first country that tried to reverse the economic incentives that encouraged pollution. During the 1970s, pursuant to the Clean Air and the Clean Water Acts, an economic model was developed that quantified the full benefits to polluters from noncompliance. The "BEN" (Benefits of Environmental Noncompliance) model, formally adopted in 1984, has become the primary tool of federal enforcers for assessing the level of civil penalties for violators. Rather than basing their calculations on the damage to the physical environment, which is subject to great uncertainty and debate, the levels are set in order to recoup the benefits that have accrued to polluters as a result of their noncompliance.

This research reviewed the BEN model and attempted to apply it within the Israeli context. After a description of the model's structure and assumptions, four

cases were selected from Israel's recent environmental history in which large-scale profits were reaped due to noncompliance with environmental standards and laws (illegal utilization of high-sulfur fuel by Israel Oil Refineries; effluent discharge into the Yarkon River by the Deshanim Corporation; particulate emissions by Tel Aviv's Reading Power Station; and release of hazardous chemicals into the domestic sewerage system by Electroplating Industries in Tel Aviv.) In two of the cases very low penalties were assessed.

The research developed a simplified model, to be applied on an Excel spread, that assessed the full benefits of the polluting activity. The data from the four cases was also forwarded to the U.S. EPA enforcement division, which ran the cases on their internal BEN models. The results were compared. The research also reported the criticism of the BEN model that is commonly voiced by the American state enforcers and by industry.

The analysis supports the potential of economic analysis to provide a meaningful deterring factor in the enforcement process. The paper recommends that Israel embrace the American approach to environmental violations (civil penalties alongside criminal convictions) and adopt a simplified version of the BEN model to help enforcers assess fairly and reasonably the economic benefits of environmental noncompliance.

***Enforcement of Marine Pollution Prevention Legislation:
A Quantitative Assessment of the Israeli Experience***

Dorit Talitman

This research initiative was intended to identify ways of improving the quality of Israel's marine environment through legislation and enforcement. The research focused on the implementation of two laws: the Prevention of Marine Pollution Law — Land Based Sources, 1988; and the Marine Pollution from Oil Act, 1980). The research reviewed 187 prosecutions filed by the Ministry of Environment's Coastal and Marine Protection Branch between 1990 and 1998. Data collected in each case included: location of violation, nationality of the violator (where the ship was registered), identity of violator, previous violations, magnitude of the damage to the environment and extent of violation, how the violation was reported,

duration of the violation, type of pollution, materials discharged, resolution of prosecution (file closed without conviction, plea bargain, conviction, non-conviction), court involved, judge and attorneys representing, and levels of fines levied.

The survey turned up several surprising findings. These included a lack of incentive for self-reporting, a tendency by international second-time offenders not to report their pollution violations, and the exceedingly low level of fines. Field research revealed that a lack of coordination between coastal enforcement agencies. For example, there is no a single emergency number for the public to report marine pollution. Several specific legislative amendments were proposed that would enable a more effective enforcement policy and, presumably, a cleaner marine environment. These include self-reporting requirements in laws, financial incentives for reporting, expanding the strict-liability aspects of marine pollution violations, and mainstreaming the fines process to avoid unnecessary court hearings for minor violations.

Public Interest Environmental Enforcement in Israel

Orit Marom-Albeck, Alon Tal

Although the Israeli public is clearly concerned about the continued deterioration in the quality of the environment, its enhanced awareness of this problem has not been manifested in the legal realm. There was no noticeable increase in the number of citizen enforcement actions during the 1990s, despite a virtual revolution created by a series of amendments to the law in the standing of citizens and new environmental legislation that literally flung open the doors of Israel's courts.

The issue poses a quandary for legal scholars. The United States, which faced a similar environmental crisis in the late 1960s, has achieved vast improvement in various areas. While centralized regulation by the federal and state environmental agencies has been the main engine of progress, the role of citizen suits and public interest environmental law has also been a significant factor. Recently, the number of citizen suits and public interest law organizations has increased dramatically not only in Europe but in many developing countries as well. Yet, with the exception of the establishment and work of public interest law organization Adam Teva V'din

(Israel Union for Environmental Defense), the past decade has been markedly devoid of legal battles by citizens to enforce environmental standards and to "hold polluters' feet to the fire." This article explores the reasons why.

After considering the American experience with citizen suits, a brief review of international approaches is offered. The Israeli legislative infrastructure is described along with examples from a thorough review of 250 cases filed by the public in Israel to promote environmental interests. Four fundamental and substantive discrepancies between Israeli statutes and the American situation emerge from the analysis. These include the American emphasis on full payment of attorneys' fees, self-reporting requirements, punitive damages, and the civil nature of environmental violations. The article argues that the road to changing Israel's poor public participation performance involves a fundamental revision in the present statutory approach. While adoption of an American paradigm, including civil penalties, cannot guarantee greater public involvement, it certainly offers potential to harness public environmental commitment for progress in the realm of legal enforcement.

Self-Reporting – Key to Improved Environmental Enforcement in Israel

Dorit Talitman, Alon Tal

To enhance its enforcement performance, Israel's Ministry of Environment doubled its team of field inspectors several times during the 1990s, and today there are over 80 inspection personnel working at the Ministry. They join hundreds of other enforcement personnel in Israel's municipalities, nature reserves, and other agencies. Yet, research suggests that increased staff is an inadequate solution to meet the challenge of environmental violations, particularly as the country's pollution profile shifts to reflect more numerous and dispersed sources of contamination.

Internationally, "self-reporting" has emerged as a central tool in successful environmental enforcement strategies, enabling government personnel to oversee emissions and environmental performance via remote control. Among the many benefits of self-reporting are: early identification of damage, swift and efficacious

remedial responses, improving the focus and priority-setting capabilities of regulators, and long-term monitoring of problematic environmental industries in real time.

Two basic approaches have been shown to foster an effective self-reporting system: The first is based on deterrence, with stiff penalties meted out for failure to report or for imprecise reporting. The second involves economic incentives, with special licenses, permits, and tax discounts being granted in return for conscientious self-reporting.

The article reviews examples of environmental self-reporting policies from the U.S., Finland, Poland, Sweden, and Norway and compares them with present Israeli policy, in which the expectations of self-reporting for the regulated community and the self-reporting requirements are minimal and not clearly defined. Based on the literature review and interviews with dozens of Israeli enforcement personnel, specific recommendations are made to improve Israel's present policy posture in this area.

In practice, since the 1970s, Israel has had a series of normative frameworks that mandate environmental self-reporting. These include a law for regulating land-based discharges to the sea, the Licensing of Businesses Law, industrial accidents under the Hazardous Substances Law, and others. However, the "carrot and stick" approach does not appear to be effectively utilized. Insufficient manpower and regulatory time are devoted to overseeing these systems, especially in the area of spot checks and detailing self-reporting requirements in operational permits. Inadequate cooperation between field-inspectors and permit writers and experts in Ministry offices also weakens the oversight capabilities. Moreover, industries frequently succeed in hiding substantial violations in a mountain of paper work due to the unfocused demands for information at the Ministry of Environment. Finally, there is a lax approach to omissions and inappropriate reporting at the Ministry of Environment that sends a clear message to the regulated community.

The authors recommend a number of measures to improve the present situation and strengthen the self-reporting system. Chiefly, they call for the enactment of a unified self-reporting law to codify requirements for environmental self-reporting in a clear and consistent manner across environmental media. The law would contain provisions that require factories to report emissions in all relevant environmental areas, attach significant penalties to a failure to meet these require-

ments, and establish a legal basis for continuous monitoring among potentially egregious polluters. Significantly, the law would establish the requirement for submitting self-reported environmental measurements to a computerized database, which would be accessible to the general public via the Internet and through government offices.

Even in the absence of statutory amendment, reform in the area of self-reporting is possible based on the present legislative norms in Israel. For example, factories can be required to conduct continuous monitoring with results appearing directly in Ministry of Environment computers. There is no obstacle to an enforcement policy that conducts constant surprise spot checks in factories that already face self-reporting requirements. A database can readily be established to receive relevant measurements and identify deviations from environmental standards. An interdisciplinary team of experts should be assembled to define the critical parameters for which self-reporting is required. Finally, an uncompromising prosecution policy against violators of self-reporting requirements would raise awareness and compliance within the regulated community.

***Integrating Infrastructures:
A Tool for Preserving Open Spaces***

Nir Papay

As population growth in Israel continues apace, population density increases accordingly. As a result, land has become a scarce resource with competition for different uses becoming more intense. This is reflected in high land prices across the country. This situation requires a rethinking of basic planning paradigms, which in the past assumed abundant land reserves, and forging new approaches to land use and planning. These new approaches must be more efficient in land utilization, with a preference for technologies that are developed by engineers to conserve land resources.

The single greatest usage of land is for infrastructures. The actual amount of land "neutralized" by infrastructures is inflated by the margins of safety ("road strips" or "building lines") mandated by law, which have a profound affect on zoning. As the demand for infrastructure increases with the growing population

and higher standard of living, increasingly large swaths of land are taken out of use or neutralized by infrastructures. Moreover, it has become increasingly difficult to identify new corridors in which infrastructures can be placed, owing to the high price of land and the densities of land uses, given the time required for planning and implementation.

These factors have recently made "infrastructure corridors" a salient topic among Israel's professional community of physical planners. The term "infrastructure integration" refers to the merging of linear infrastructures into a single band. The research considers the question: Why, where, and how are conditions ripe to merge infrastructures, and what are the key factors affecting implementation?

Four categories of approaches to this challenge exist:

1) Vertical three-dimensional integration: This involves establishing three spheres of planning for a single piece of land.

2) Utilizing existing infrastructure corridors: Typically the amount of land allocated for a single type of infrastructure is broader than is actually needed and the land can be shared for other infrastructure uses.

3) Merging "building lines": The law establishes corridors for particular land uses which could also accommodate infrastructures.

4) Internal, systemic integration: This refers to bringing together different forms of the same infrastructure system.

The research demonstrates that merging infrastructure corridors can indeed produce substantial savings of land. The least expensive of the above option appears to be adopting a "building lines" approach. The author also addresses the question of the demanding schedules for establishing infrastructures as a major obstacle to more efficacious integration, as the coordination requirements cause delays which are often deemed unacceptable, making separate (and wasteful) infrastructure corridors the "flexible" default option.

The costs of merging infrastructures typically devolve on the developers of a plan. This disparity between the public good and private expenses is generally not resolved to the advantage of the public interest. Finally, the author points out that while land costs steadily increase over time, the cost of merging infrastructures is constant. Unfortunately, by the time the high costs of land make merging infrastructures a cost-efficient course of action, separate infrastructures will be an irreversible fact. The author calls for greater government involvement in order to

produce a socially optimal planning option, leading to a policy that maximizes use of Israel's scarce land resources.

Shared Management of Groundwater: From Theory to Reality

Eran Feitelson, Shaul Arlosoroff

It is clear that at some point in the future, Israel and the Palestinians will have to share the mountain aquifer. The aquifer constitutes the highest quality water body for both parties and an essential component of their water resources. The article's objective is to characterize the measures and institutional aspects of joint aquifer management in the future. Five objectives should constitute the basis for establishing a joint management framework.

Water Quality Protection: Because neither side has the ability to unilaterally protect water quality, this constitutes the paramount common interest of both sides. This will require limitations on pumping allocations, land use regulations to prevent pollution, sewage treatment in the recharge areas, and restrictions on wastewater reuse.

Responding to Crises: The risk of conflict increases with the onset of a crisis, such as protracted droughts. Different types of crises include sudden crises (i.e., identifying toxic chemicals in drinking water sources), chronic crises (such as draughts) and crises produced by unilateral activities (e.g., overpumping.) Three types of activities are required to address such crises: identifying the crisis, agreeing on measures that must be taken to respond to the crises, and implementation of these measures. These require joint monitoring for identification and a mechanism for making decisions as well as for identifying inappropriate activities by one of the parties, without turning their resolution into a diplomatic crisis.

Efficiency in Water Utilization: As demand for water increases, the need for efficiency grows. This will require changes in water usage (from agricultural to domestic) as well as among users (from low to high efficiency.) Economic tools, including water markets, are one way to increase efficiency.

Efficiency in Water Delivery (Privatization): The last decade has seen an increase in the potential of the private sector's possible role in water delivery and

in wastewater treatment. In the Israeli-Palestinian context, this has additional advantages of turning these issues into economic rather than political matters. Given the prevailing distrust, issuing a public tender constitutes an important bonding activity, with both sides sharing the interest of reaching the best possible deal.

Comprehensive and Integrated Joint Management: It is important that a management mechanism be established that can address the full range of future hydrological problems. The Bellagio draft agreement constitutes one example of such a framework, although others are readily conceivable. The mechanism initially should at the very least include a monitoring and information dissemination function acceptable to both sides. Later it will need to deal with crisis and conflict resolution, a much more challenging task politically.

Confidence building measures are important at the present stage to move a shared management strategy forward. This could include enhanced reliability of water supply to Palestinian homes in summer and fresh-water delivery to rural villages that remain unattached to the grid. The perception by each side that the other is wasteful of water is a negative factor in this regard.

The joint system that emerges should include mechanisms for insuring the financial stability of the water management system. Funds can come from the parties, users, or international donors. Revenues for such a system may be arbitrary at times, while expenses will be steadier, requiring balanced and thoughtful financial management.

A Proposed Israeli Policy for Addressing Global Warming

Noam Gressel, Nir Becker, Doron Lavee

Under the Kyoto Protocol, which addresses global climate change, the developed nations are required to reduce their "greenhouse gas emissions" to 1990 levels. At the same time, "developing nations" are exempt, for the time being, from taking measures to this end. Even though Israel was categorized a "developing" nation for purposes of the Protocol, its decision-makers are considering the implications of a voluntary greenhouse gas reduction policy.

In conjunction with Ministry of Environment officials, the authors defined possibilities for a national action program: This article identifies core policies and technologies that will reduce the greenhouse gas emissions in Israel. This will allow Israel to meet international requirements as defined by the Kyoto Protocol, thus gaining key international and national benefits from the voluntary undertaking.

The article presents "upper limit" estimated costs of different national policy strategies. These could be dramatically reduced with introduction of new, breakthrough technologies. Current worldwide R&D efforts suggest that "clean" new technologies will probably be introduced in the near future which will make the actual costs of implementing these policies significantly lower.

In 1996, the "baseline" year for comparison in Israel's case, 61,800 tons of greenhouse gases (kilotons of CO₂ equivalents) were emitted. Under a "business-as-usual" scenario, by 2010 some 100,000 Kt CO₂ eq. will be emitted. By 2015 the level would reach 118,000. After implementing "clean" measures already underway, an additional 20,600 KT CO₂ eq. will need to be eliminated by 2010, and 35,900 by 2015. The article proposes that these emissions could be reduced by using a demand-managing carbon tax alongside programs that mandate energy efficiency and clean production and eliminate existing market failures in energy, construction, and other market sectors.

The results of the economic analysis suggest that the maximum additional burden to the Israeli economy (without considering the attendant benefits) resulting from the necessary reduction in gas and electricity usage would reach a level of roughly 1.4 percent of the GNP by 2010. If the 2015 objective were met, the level would be 2 percent of the GNP. At the same time, the attendant benefits were quantified, including air pollution reduction and a "double dividend" following the restructuring of tax burdens. These results show that when the added benefits are considered, the cost to the national economy drops dramatically, and by 2010, net benefits will actually accrue as a result of meeting global warming prevention objectives.

Quantification included only the benefits of health and environmental improvements arising from reducing the attendant pollutants like SO₂, NO_x, and particulate matter, and of tax reductions, such as a cut in income taxes and the resulting greater incentive of tax-payers to work. Other benefits were not quantified and should add to the positive outcome of a national policy to reduce greenhouse gases:

- ◆ Economic benefits from reduced transportation or enhanced energy efficiency in buildings, including a decline in car accidents, time-saving, or reduction in parking spaces.

- ◆ Increased opportunities to trade "carbon credits" when the international market eventually emerges.

- ◆ Improved access to European and American markets as well as international funding, especially in information intensive industries, providing an advantage relative to other developing countries.

At the same time there will be very real costs to the Israeli economy, including the necessary investments required for transfer to cleaner, but more expensive technologies.

Encouraging Environmental Innovation in Industry

Nir Ben-Aharon , Chen Levine

This article assesses the national policies to encourage technological innovation among Israeli industries that produce environmental technologies. Environmental technological innovation enables a "positive" sum game and sustainable development, but requires broader public support and involvement in establishing new rules for such a "win-win" scenario. Recent findings from research in the field indicate the importance of a two-prong policy: On the one hand, technology-forcing standards are set with the objective of pushing the regulated industry towards improved environmental performance. However, these quantum leaps in technology do not occur by themselves, and require policy instruments to spawn innovation such as subsidies and support for environmental research and development. Such a policy should be based on cooperative models among the private/public sectors rather than on those that assume conflict.

The authors compare the government funding for environmental R&D in Israel with other OECD member-countries. There is a striking contrast between the paltry 0.3 percent for environmental R&D of total government-funded R&D in Israel, and the 2.9 percent of government funds invested on average in environmental research in the other countries. Indeed, a table in the study shows Israel in last place among the 24 OECD countries in this category.

Specific programs for environmental technology research are analyzed along with related government grants to develop them. While the academic sector has done considerable work in the field, the outcome of this research as measured in environmental academic publications has not increased since 1993. The relative rate of requests for environmentally related patents from Israeli inventors is also low when compared to other countries. The authors found a conspicuous lack of cooperation between Israel's Ministry of Environment and the Ministry of Industry and Trade in the area of technological innovation, leaving the 1.5 billion shekel annual industrial R&D budget largely untargeted toward environmental areas.

The article calls for establishing a clearly defined policy to encourage environmental innovation. In particular, greater cooperation is needed between the Ministry of Environment and the Ministry of Trade and Industry, with better integration of environmental objectives in the latter's operational agenda. Moreover, the need for importation of environmental technologies in local applications is highlighted. Presumably, a national policy which truly fosters environmental innovation will not only benefit Israel (and the world's) environmental quality, but the national economy as well.

Patterns of Recreation in Natural Settings in the Open Areas of the Judean Mountains

Menachem Zalutski

The article sums up a detailed survey conducted in the Judean Mountains, which examined the demand for recreation and leisure-time activity in natural settings at 12 different recreation and hiking sites of varying accessibility and character. The survey found that the Judean Mountains constitute a recreation center on weekends and holidays, particularly for residents of Israel's core region. Thanks to the short traveling time, the residents of Metropolitan Tel Aviv and Metropolitan Jerusalem can reach the sites on their own and spend a day in the outdoors. Most of the visitors to the sites spend less than two hours there, usually picnicking, and have no sense of crowding. The preference is for sites with water sources, and the preferred seasons are the spring and fall. On weekdays, in contrast, visitors tend to

arrive via organized tours for hiking. The majority of the visitors return to the sites or the walking trails in the hills.

The open areas in the Judean Mountains are of crucial importance with regard to regional planning. The unique importance of the areas, combined with the demand for recreation in a natural setting, requires their statutory preservation as nature and landscape values and as recreation facilities, thus meeting the growing demand of the population in Israel's core region for recreation in natural settings.