

BIODIVERSITY CONSERVATION IN ISRAEL

FINANCIAL INNOVATIONS LAB® REPORT



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MILKEN INSTITUTE



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Financial Innovations Labs[®] bring together researchers, policy makers, and business, financial, and professional practitioners to create market-based solutions to business and public policy challenges. Using real and simulated case studies, participants consider and design alternative capital structures and then apply appropriate financial technologies to them.

This Lab report was prepared by Caitlin MacLean, Glenn Yago, and Steven Zecher. The Institute thanks the Lab participants for their contribution to the report, and especially thanks the Ministry of Environmental Protection for their guidance.

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Biodiversity, as a public good and as a pool of environmental assets, is currently undervalued and at risk.

Introduction

Urbanization, industrialization, and climate change are taking a greater toll on the planet by the day. Human activity is having a profound effect on the ecosystems that surround us. As populations increase and once-open land is developed, species and habitats disappear. This destruction affects water quality, soil erosion, and agricultural productivity.

These trends are starkly apparent in densely populated Israel, where water is scarce and competition over land use is fierce. Located at the nexus of three continents, it has always been home to an exceptional diversity of flora, fauna, and complex ecosystems. For a nation of such small land area, it boasts a disproportionate percentage of global biodiversity.

But as population density has grown steadily over the past decade, there has been a sharp increase in commercial and residential development in once-pristine areas that supported a rich variety of animal and plant life. Vultures,¹ multiple bat species,² and Eurasian otters (*lustras*)³ are just a few of the many creatures whose numbers have dwindled to critical levels. The Hula painted frog, which was thought to be extinct, has been spotted again, but it remains on the brink.⁴ Scientists have warned that up to one-third of the plant life along Israel's coast may be in jeopardy.⁵ And disappearing sand dunes threaten the survival of unique desert creatures.⁶

There is an urgent need for improved conservation. But previous efforts to protect the country's environmental assets have largely relied on regulatory policies alone, with a focus on designating protected areas through a national park system and statutory land-use master plans. This has proven ineffective in stopping habitat fragmentation and degradation as a result of agricultural, residential, commercial, and industrial development.

Biodiversity, as a public good and as a pool of environmental assets, is currently undervalued and at risk. There has been no incentive to change market behaviors toward land use. Public budgetary expenditures for conservation of open areas, for the national parks authority, and for sustainable local development have been inadequate.

In recent years, however, financial mechanisms have been created around the world to create new incentives and new momentum for conservation efforts. Payments for ecosystem services, land auctions, and other compensation programs have been utilized in multiple countries. Biodiversity banking, for example, creates opportunities for developers to trade the offsets of potential destruction while earning revenues on increasing land values.

The time has come for Israel to join the ranks of both developed and emerging nations around the world that have adopted biodiversity financing programs. The programs now in place include watershed and wetland protection, water services, soil conservation, wildlife protection and carbon sequestration, land management agreements, recreation, and initiatives to clear invasive alien plants and restore the beauty of the natural landscape.



The Hula Valley is home to much of Israel's rich biodiversity.

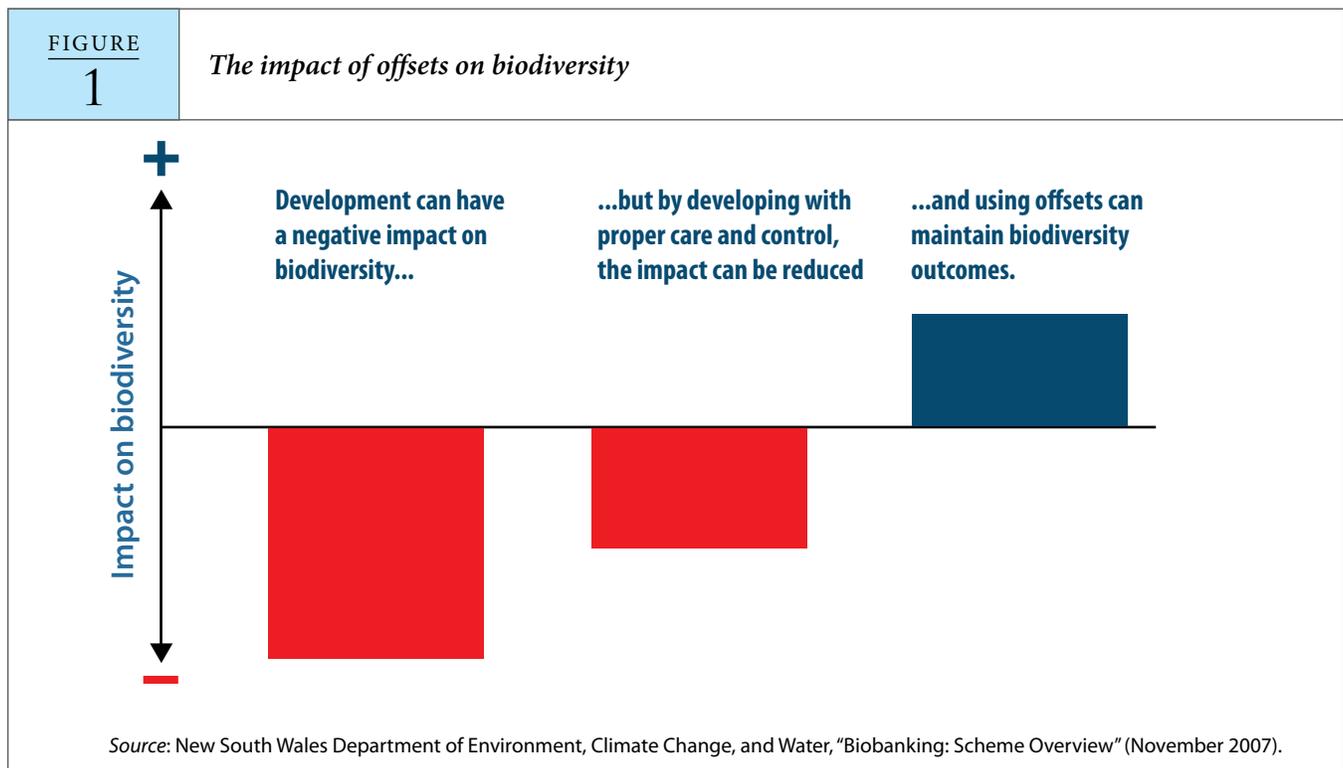
Could these ideas work in Israel? The Milken Institute, in conjunction with Israel's Ministry of Environmental Protection, convened a Financial Innovations Lab® to evaluate potential incentive programs and other financial mechanisms that could be used to appropriately value the nation's biodiversity. The session brought together a diverse group of scientists, capital market experts, governmental officials, foundation executives, architects, and land developers to design potential models and localize the best international solutions to fit the Israeli context.

Participants discussed how to achieve the optimal level of conservation while maintaining cost efficiency. Following presentations on specific programs in countries like the United States and Australia, participants debated which models could be most applicable to Israel. There was a focus on identifying and overcoming potential barriers to the adoption of these models. Participants then suggested examining case studies to further test the feasibility of financial mechanisms to align environmental protection with economic growth in Israel.

Issues and Perspectives

Any potential market-based solutions to protect biodiversity require the involvement of many stakeholders. Biodiversity is impacted by all human activity, so it is critical to understand each stakeholder’s role. The goal is to create mechanisms to support activities that result in no net loss of ecological value (see figure 1). Any successful effort will need to engage residents at the local community level.

Lab participants outlined the current barriers to implementing conservation policy and financing in Israel. Currently, there are gaps along the entire biodiversity value chain, from land management to conservation programs to park development.



GEOGRAPHICAL CHALLENGES

Since Israel has a total area of just under 21,000 square kilometers, it was only a matter of time before the nation's land crunch began to significantly imperil nature. Indeed, by 2020, the country is expected to double land area that is developed. While more than 20 percent of Israel's land is protected in national reserves, most of that is in the south; only 3 percent of the Mediterranean region is preserved.⁷

Israel and the surrounding region are home to almost 3,000 plant varieties, as well as 7 amphibian, 97 reptile, 511 bird, and 116 mammal species.⁸ It is critical to maintain space and resources to allow for these species to survive, but development has come at the expense of biodiversity. Over the past century, for example, nearly a third of Israel's vertebrates have suffered either extinction or a reduction in their populations due to human activity—whether hunting, agricultural practices, urban and industrial development, or pollution. Preventing the continued destruction of the natural world requires both public and political will.

Israel's size and relative population density are only part of the issue. The very diversity of its terrain is also a hurdle to overcome. For example, the arid climate in the south features vastly different species and landscapes than the more temperate and wooded north—and because of those differences, there are very few opportunities to transfer land use from one region to another for the purpose of conservation.



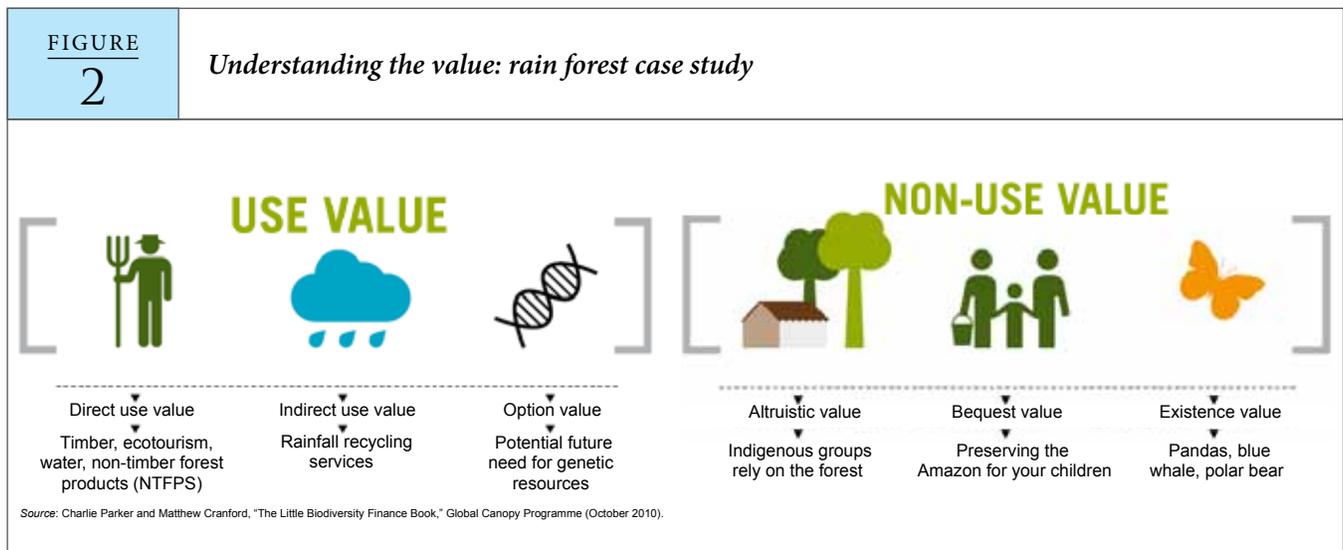
Moti Shechter of IDC Herzliya explains the benefits and challenges of Israel's diverse terrain.

RESEARCH CHALLENGES

Conserving biodiversity requires the entry of the private and philanthropic sectors with financial solutions that appropriately value these natural assets. Unfortunately Israel does not currently have effective mechanisms for valuing and financing ecosystem services.

The research that has been done to date has largely focused on mapping of species and habitats, which was a necessary first step in adopting the country’s national biodiversity plan and strategy.⁹ The concentration on ecosystem services has been sporadic and mostly confined to the agricultural sector.

This lack of specific research is largely the result of the complexity involved in the scientific method of valuation (see figure 2). For example, ecologists and economists have to agree on the value of a recharge of an aquifer or watershed on the surrounding vegetation, soil, and overall water quality. This recharge can be the result of a variety of sources, all of which need to be monitored and measured, as do the results of the recharge on the environment. Consequently, most values assigned to the services are relatively rough estimates. However, the Ministry of Environmental Protection recently decided to conduct an ecosystem valuation study as part of the country’s commitment to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The study is currently in the early stages of planning.



Another explanation for the lack of valuation research is the academic community’s aversion toward monetizing environmental assets, goods, and services in general. Many ecologists in the field have traditionally been reluctant to place a dollar figure on biodiversity—after all, in the minds of those who care about the environment, it is quite literally a priceless asset. However, without a price discovery process based upon valuation, the importance of environmental services in preservation, storage and stability (e.g. water, carbon), risk reduction (flood control, protection from fire), and natural resources quality enhancement (through soil and water conservation) will continue to be ignored and environmental degradation will continue to accelerate. Public-private partnerships need to emerge to invest in biodiversity conservation to overcome these issues.

LEGISLATIVE CHALLENGES

While limited land and the lack of quantitative research for economic modeling are serious roadblocks, many of the issues related to biodiversity conservation in Israel involve current legislation that regulates land use and ownership rights.

In Israel, the state owns almost 95 percent of the land. Its development is, therefore, highly regulated. Properly managed in the context of ongoing land reform, state ownership should be an advantage in administering financial solutions for biodiversity conservation. However, any financial model that is utilized will require significant effort, both legislative and financial, on the part of the government. Because the goal of many of the financial products, policies, and programmatic tools is to leverage public money with private capital, policy changes will be needed to engage and incentivize markets for conservation through reformed land-use rights. Indeed, as participant Charles Perrings of Arizona State University states, “Internalizing externalities implies assignment of rights.”

The regulatory system in place to protect biodiversity has so far largely focused on the designation of land as a national park. However, this has proven unsustainable, as many imperiled species are in areas that will not be available for parkland. Valuing ecosystems means more than setting aside national parks. It means coordinating with land developers, agricultural producers, and city planners to take into consideration the ecological and financial effects of natural habitat destruction.

Any solutions involving regulation from the government will also necessarily have financial constraints. The budget for conservation in the Ministry of Environmental Protection is only around 2 million NIS. A larger portion of funding goes to the Nature and Parks Authority, which has closer to 500 million NIS for maintenance and preservation of the national parks system.

Lab participants agreed that a significant demonstration of political will is needed to facilitate a paradigm shift in how the government approaches and funds biodiversity conservation. Without this force, it is clear that few solutions will be initiated or sustained. Because the government controls the majority of the land, and its subsequent use, there is a critical need to have a unified policy toward appropriately valuing biodiversity.

Financial Mechanisms for Biodiversity Conservation

While participants felt that there were significant hurdles to overcome before innovative financial models could be adopted in Israel, many agreed that the structure of the mechanisms should be suggested and examined now. The Lab included presentations from international experts who have successfully enacted policy and financial innovations to increase incentives for conservation in both the public and private sectors. Participants then discussed how to tailor these potential solutions to work in Israel. A large emphasis was placed on what was both desirable in terms of long-term goals and viable in terms of Israel's regulatory and geographic realities.

SOLUTION

1

Payment for Ecosystem Services

The notion of placing an economic value on environmental services has gained popularity over the past decade, following an increased interest in monetizing carbon to reduce emissions and mitigate the destructive effects of climate change.

However, beyond carbon sequestration, there has been less momentum around the economic value of other ecosystem services. These can vary from flood protection and improved water quality to preventing soil erosion and improving pest and disease control (see figure 3). Categories of environmental services include pollution prevention (modifying environmentally damaging activities), conservation to provide payment for activities to preserve natural resources (e.g. forest resources, farming practices), and creating environmental amenities (e.g. wetland restoration, parks, urban biodiversity sites). Assigning an actual price to these ecosystem services could change the behavior that has led to the degradation of Israel's environment.

FIGURE
3

Mapping the economic value

Biodiversity	Ecosystem goods & services (examples)	Economic values (examples)
Ecosystems (variety & extent/area)	<ul style="list-style-type: none"> • Recreation • Water Regulation • Carbon storage 	Avoiding greenhouse gas emissions by conserving forests: US\$3.7 trillion (net present value)
Species (diversity & abundance)	<ul style="list-style-type: none"> • Food, fiber, fuel • Design inspiration • Pollination 	Contribution of insect pollinators to agricultural output: ~ US\$190 billion/year
Genes (variability & population)	<ul style="list-style-type: none"> • Medicinal discovery • Disease resistance • Adaptive capacity 	25-50% of the US\$640 billion pharmaceutical market is derived from genetic resources.

Source: TEEB – The Economics of Ecosystems and Biodiversity Report for Business – Executive Summary 2010.

There are, however, countries that have begun to utilize data to value ecosystem services to appropriately incentivize landowners to opt out of more ecologically destructive behavior. Payments for ecosystem services can take a variety of forms, from agrobiodiversity schemes to carbon sequestration programs. Payment usually involves voluntary transactions, with at least one service buyer and one service provider. To be effective, payments should be conditional on the services being provided.

In Israel, payments could take a variety of forms. More developed proposals, like banking schemes and auction systems, are discussed below. However, there are additional means of crediting that might be easily transferable to the region.

Participants discussed potential payment ideas, highlighting tax breaks for improved management of land and more sustainable development as ideas that are widely supported in the country. Similarly, land trusts are already in the nascent stages of development; the Fund for the Protection of Open Spaces, for example, which is based on designated revenues from improvement taxes, would potentially have 55 million NIS to support ecosystem services.

Pooling the capital from existing sources into a larger fund that can leverage payment for ecosystem services was an idea that seemed very attractive to Lab participants. Leveraging and targeting these tax revenues with other potential guarantees or credit enhancements by the government and/or philanthropic sectors would vastly expand the financial resources available for biodiversity conservation in Israel.

SOLUTION
2

A Biodiversity Banking Scheme

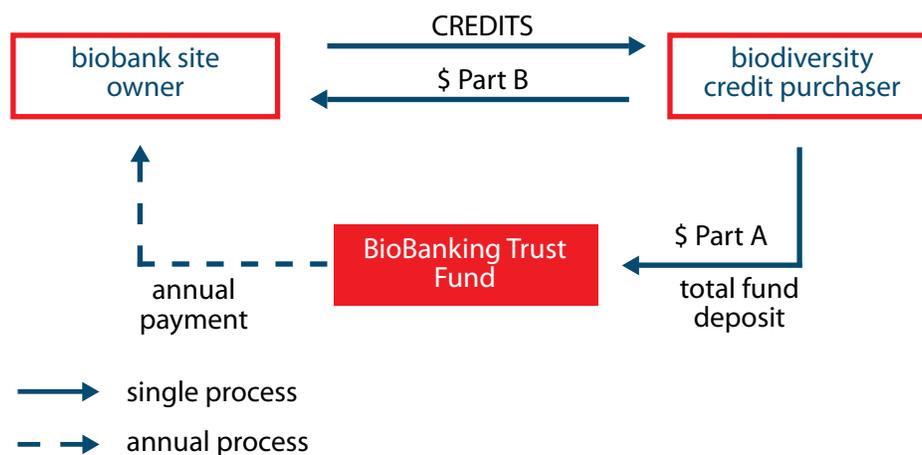
The process of internalizing the external benefits of protected areas is at the heart of biodiversity offset schemes such as wetland mitigation and conservation banking. At their core, these two instruments are designed to reduce the impact of development on biodiversity.

Within the U.S., biodiversity offset schemes date back to the 1970s, and have historically focused on wetlands and streams. However, more sophisticated endangered species mitigation credit banking systems (now known as conservation banking), emerged in the 1980s and 1990s, most notably in California. Agencies such as the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Army Corps of Engineers, and the California Department of Fish and Game are the primary players in terms of oversight and regulation.

Wetland mitigation in the U.S. is largely driven by compliance with the Clean Water Act and the principle of “no net loss.” In its simplest form, applicants seeking permission to drain, fill, or dredge wetlands and streams have several options to offset the impact of their plans. For example, developers can personally offset their planned activities by paying to preserve a comparable land parcel. Alternatively, the developer can pay into a compensation fund program in lieu of creating their own offset, or simply purchase an offset credit via a third-party mitigation bank (see figure 4). Offset credits are created by non-profits, for-profits, and government entities. According to Ecosystem Marketplace, there were 431 active wetland and stream mitigation banks in the U.S. as of 2009, with 88 sold-out banks and 182 pending; their total annual credit volume was between \$1.3 billion and \$2.2 billion.¹⁰

FIGURE
4

Biodiversity banking scheme



Source: "Biobanking: Biodiversity Banking and Offsets Scheme." Department of Environment and Climate Change, Government of Australia, 2007.

Similar to the wetland mitigation process are offsets to address the destruction of habitat for particular species. Developers may offset their impacts by developing their own species offset, in-lieu fees, or purchasing a credit—though in this case, the credit is purchased from a conservation bank. Offsets are traditionally created through preservation and management of comparable habitat, and must be permanently protected; one unit of credit typically equates to an acre of habitat. According to Ecosystem Marketplace, as of 2009 there were seventy-seven active conservation banks in the U.S., with nineteen sold-out banks and twenty more pending; their total annual credit volume was between \$200 million and \$370 million.¹¹

In Israel, a biodiversity banking scheme would need to be modified to reflect the fact of government ownership, while also leveraging the resources of environmental NGOs and national institutions (like the Jewish National Fund). Lab participants suggested that this would actually make the process easier.

Because the government owns roughly 95 percent of the country's land, it can more easily transfer development rights from one parcel to another, based on the environmental impact. As development rights are usually leased in Israel, the banking scheme would also require legislation to support land-right exchanges.

One Lab participant discussed the example of Park Ayalon. There, developers created an open-space plan to compensate for their requested right to develop a piece of land that had tremendous ecological value and delivered ecosystem services (in this case, drainage that prevented flooding on the Ayalon Highway). It was clear to participants that in order to establish a banking scheme, regulation would need to be put in place to require a zero net loss (of comparable habitat and ecosystem function), similar to the legislation in the United States.

Because the government owns such a large portion of the land, the bureaucracy needed to regulate and maintain a banking system would be significantly more streamlined than in those countries where private ownership is much more prevalent.



The hoopoe is the national bird of Israel.

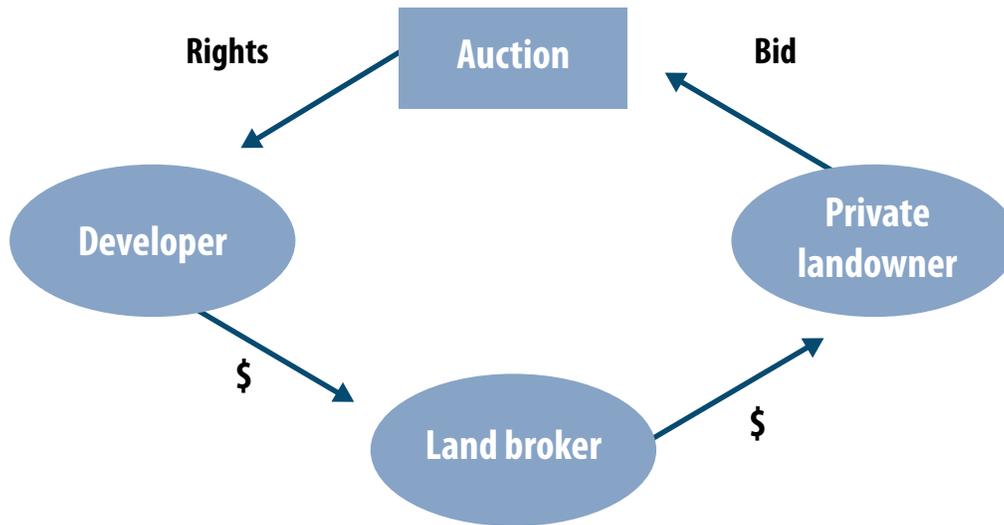
SOLUTION
3***Biodiversity Auctions***

Conservation auctions have become a leading market-based mechanism in Australia for biodiversity protection (though the word “auction” can be a bit misleading—the process does not involve multiple buyers bidding up the price of land). For the most part, conservation auctions are funded by offset schemes in which private developers pay a calculated fee when they undertake a project; government (usually at the regional level) pools the funds, which are then available for financing conservation of other land parcels.

In its simplest form, a conservation auction involves private owners tendering a price (in the form of a bid) for what they perceive as the relative cost of preventing degradation of their holdings. The single sealed-bid reverse auction allows for the process of price discovery, and an oversight board that administers the process can deny bids that are unreasonable. The bid may be the amount needed to cover the costs of tasks such as protecting and managing existing native vegetation, supplemental planting, or planting of a buffer around remnant vegetation.

In essence, commercial real estate developers are paying for private landholders to manage their lands in a manner that protects biodiversity. This market-based approach results in little to no overhead cost and maximum efficiency.

The contracts underlying conservation auctions are crucial to their success. Typically, contracts are outcome-based agreements that entitle the landholder to compensation based on a set of measurable improvement metrics that must be met over time. Punitive clauses are essential. While annual self-reporting is integral to the oversight process, site audits conducted by local management authorities are also necessary. Through this oversight process, program administrators are able to estimate a market price for various types of conservation gains. The value of the sites is assessed on the basis of the condition of native vegetation, as well as the significance of the property within a context of landscape and biodiversity priorities (see figure 5). The goal is to better protect and maintain site conditions, enhance fire protection, and reduce threats to biodiversity heritage.

FIGURE
5*Auction design*

Participants agreed that this idea had strong potential for being adopted in Israel. Land management was seen as a key element to success. Because auctions support effective utilization of land by valuing future improvements to a property, the government would be able to control the amount of funding it would need to allocate, with little risk to the expected long-term return. According to Lab participant Patrick O'Connor, who has worked extensively on auctions in Australia, these types of mechanisms can be started with a small pilot program.

Mapping Potential Pilot Projects

Each of the financial models discussed by Lab participants requires designated revenue streams to ensure that potential investors could receive both a social and financial return. To understand how these capital flows could be generated, pilot projects currently under way were examined. A representative from each pilot participated at the Lab, as well as during subsequent follow-up sessions. The projects are in controlled, geographically defined areas, as a starting point, but the benefits of restoring these areas' biodiversity could be shared by the country as a whole. Below is a review of the projects and how they might best be integrated into the financial models discussed.

PILOT: RAMOT MENASHE BIOSPHERE RESERVE

In the heart of the Jezreel Valley, Megiddo and neighboring communities enjoy some of Israel's most beautiful natural scenery. A region widely known for its agricultural output, it features a mix of forests and natural springs that support rich biodiversity. But the region is also the focal point for many national infrastructure projects, including a high-voltage distribution line for the Israel Electric Corporation, a gas turbine, a new city and industrial park, and an expansion of the Trans-Israel Highway. Because of the need to balance nature with development, in 2006 the Megiddo Regional Council established Ramat Menashe Park, 8,400 hectares meant to accommodate agriculture and residential growth while preserving open landscapes.

This model for combining nature preservation and human activity led the UNESCO council to designate the area as Israel's first "Biosphere Reserve."¹² The program creates a standard model for promoting biodiversity conservation with a regional approach that integrates development rather than excluding it. The program supports knowledge sharing, and with the designation come additional technical resources from UNESCO.

Current Costs and Controls

A northern district master plan has been drafted to outline the best ways to protect the region's forests and nature preserves. There is ongoing work to inventory the plants and wildlife in the area as a first step in engaging stakeholders in various zones, depending on use and biodiversity concentration.



The Jezreel Valley supports significant agricultural activity, as well as important biodiversity.

The Regional Council provides operating support for the area's communities to promote public education on biodiversity issues and bring together industry stakeholders to build consensus on land use and development projects. Further, the Regional Council is developing stewardship and monitoring programs for its biodiversity assets, to determine the best potential revenue sources.

Potential Integration into Financial Models

Participants discussed how to structure the pilot to utilize the financing models. In this case, the banking scheme and the auction models seemed most appropriate. Given the appetite for development in the region, models that assign specific monetary value to the land, based on species concentration and potential use for the land, may be viable for this biosphere. There has also been an effort to include development fees based on how the land will be used, in a controlled biodiverse area. Park fees could also be pooled to generate a sustainable source of funding.

PILOT PROJECT: JERUSALEM LOCAL ACTION FOR BIODIVERSITY

Jerusalem joined the international program Local Action for Biodiversity in 2010. As part of this initiative, the city is integrating conservation as a formal part of its master planning process. The program will include formal parks and conservation areas throughout the urban area and the surrounding hills. A multiyear biodiversity survey identified more than 150 biodiversity assets in the city and its outskirts.

The goal of the Jerusalem biodiversity strategy and action plan will be to make nature part of the urban fabric, including residential and commercial centers, new developments, and recreation and heritage development. All aspects of the city's management of urban life will reflect a value for nature and a balanced approach to its protection and preservation. Further, the City of Jerusalem will strengthen its ecotourism strategy, encouraging international tourism not only on the strength of its Jewish, Christian, and Muslim heritage assets but also on the quality of its unique ecological assets.

This strategy will improve the quality of life for urban residents and sustain the natural habitats found through the city.

The multifaceted approach includes

1. **Gazelle Valley.** The City of Jerusalem has recently declared this fifty-acre area, carpeted by wildflowers and populated by a small herd of gazelles, an official urban nature site. It is to be preserved as a local model of sustainable development compatible with urban construction. The City of Jerusalem is currently promoting a development plan for the park that will preserve its unique biodiversity while providing facilities for sustainable recreation, education, and tourism.



Jerusalem, despite its urban nature, is home to a variety of flora and fauna.

2. **Jerusalem Bird Observatory.** The Jerusalem Bird Observatory (JBO) serves as an education, habitat maintenance, and research center for Jerusalem, which hosts millions of migratory birds each year. Founded in 1994 as the first community-based urban wildlife site in Jerusalem, the site, only one-quarter of an acre in size, is currently operated and maintained by a staff of Society for the Protection of Nature (SPNI) researchers, educators, and volunteers. In addition to education and protection, the JBO has ringed more than 2,000 birds to identify them for study. While the Jerusalem region is recognized as a valuable habitat for migratory birds, the JBO serves as the nerve center for public and private efforts to manage and protect these biological assets.
3. **Railway Park.** The City of Jerusalem reclaimed the railroad alignment from the Old Train Station in the German Colony, creating a linear urban park that traverses commercial and residential neighborhoods.
4. **Bible Hill Conservation Program.** The historic hill behind the Khan Theater has been set aside as a vantage point from which to view the Holy Basin (including the Old City), the Kidron Valley, and the Judean Desert.

5. **Wildflower Sanctuary.** A five-acre nature reserve, once used as an illegal dumping ground, has been transformed by residents into a first-of-its-kind local wildflower sanctuary with more than fifty-five native trees and plants rescued from different construction sites around the city. Scientific research is being conducted jointly by the Jerusalem Botanical Gardens and the Hebrew University on urban greenery and wild flora salvation. A unique seedling nursery has been created with samples of indigenous wildflowers and plants mentioned in the Bible, representing a sustainable approach to landscaping.

6. **Urban parks and Community gardens.**



Sphex wasp browsing on sea squill, with the backdrop of the Old City and Bible Hill.

Courtesy of Naomi Tsur, City of Jerusalem

Current Costs and Controls

The City of Jerusalem has launched a revision to its master plan, designating forty significant urban nature sites for protection. As part of this master planning and follow-up effort, the City has hired a consultant to lead the planning and development work for specific improvement programs, including capital and operating budgets. The planning process involves stakeholders, planners, scientists, and ecologists in a LAB (Local Action for Biodiversity) program that engages the public with education and awareness programs.

Potential Integration into Financial Models

Participants discussed the best financing models for the Jerusalem LAB projects, given how much infrastructure is already developed and the land costs associated with the city. Because the projects are distinct, participants determined that a model focusing on payment for ecosystem services would be more beneficial to the city than an auction. However, the banking scheme model was also discussed as it could pertain to new land development around the city.

PILOT PROJECT: HULA VALLEY

The Hula Lake Nature Reserve, formally established in 1964 and part of a larger parcel of Jewish National Fund land, covers approximately 790 acres in the Upper Galilee's Hula Valley. The valley encompasses a variety of open spaces, farmland, villages, and almost another 10,000 acres of designated wetland areas managed by the Israel Nature and Parks Authority.



The Hula Valley includes a variety of spaces, rich with biodiversity.

The nature reserve provides a waypoint for an estimated 500 million birds that migrate annually between Africa and Europe. These birds represent more than 290 species, including cranes, storks, pelicans, ducks, waders, and egrets. The reserve is also a year-round habitat for ninety-one bird species plus a diverse selection of rare aquatic plants.

The project's goal is to maintain and expand a sustainable biodiversity asset that balances the economic and ecological goals of the region. The reserve has plans for expansion of the control areas, including passive sedimentary ponds for seasonal water flows and agricultural buffer areas.

Current Costs and Controls

The Hula Lake Reserve is managed by the Israel Nature and Parks Authority and the Jewish National Fund (Karen Kayemet L'Yisrael), and control is strictly monitored. However, the areas directly outside the park are used for agriculture and are privately held.

Participants discussed how a regional approach could specifically help the Hula Valley, given the importance of the wildlife. Tourism generated by the bird-watching is a valuable source of capital. Consequently, there is active participation from both government and philanthropic partners who shouldered some of the upfront capital costs for education, recreation, and stewardship, including the Nature and Parks Authority, the Jewish National Fund, and the Society for the Protection of Nature in Israel.

Potential Integration into Financial Models

Regarding the area's wetlands, participants discussed how the mitigation system and banking scheme used in the United States could be translated to help finance the expansion of the reserve, as well as water and agriculture buffers in Hula Valley. More exploration would be needed to determine if there was enough interest in a banking scheme, but it seems that this reserve could function as a significant resource in the scheme. It would then likely receive long-term capital for conservation.

PILOT PROJECT: KISHON RIVER NATURE AND RECREATION PRESERVE

The Kishon River flows sixty-seven kilometers from the mountains in the Palestinian Authority near Jenin, across the Jezreel Valley in the Lower Galilee, and into Haifa Bay. Years of neglect and environmental abuse led to serious health and safety concerns for neighboring communities and to the loss of one of the region's most important natural habitats. The Kishon River became one of the most dangerously polluted streams in the region, with high concentrations of toxic metals, fuels, chemicals, fertilizers, and industrial waste. The Kishon flows through farmland, open areas, more than 100 residential communities, and heavy industrial areas. In 1991, the government designated the Kishon River Authority as the primary agency to rehabilitate the river and to reclaim it as an important biodiversity asset for the region.

The pilot project would work to support more sustainable development (including community and economic development) as well as cleanup, maintenance, and operations of the river and surrounding areas.



Years of pollution have left the Kishon River in need of massive revitalization.

Current Costs and Controls

Control of the area is designated to the Kishon River Authority, as well as the municipalities around the stream. An estimated NIS 21 million in indirect revenues generated from fees for recreational activities is used to help the environmental cleanup. There has been a coordinated effort to maintain this level of conservation, especially because of the river's importance as a habitat for fish and birds and as a resource for farmers and rural residential areas around various kibbutzim.

Potential Integration into Financial Models

Given the wetlands around the river, as well as the open-use land along its length that can be used for recreation, it seems the payment-for-ecosystem-services model (as well as the biodiversity banking scheme) could provide additional sources of capital for additional environmental clean up, development of education and recreation resources, and conservation programs.

Conclusion

Protecting fragile habitats depends on properly valuing them. Assigning them a real price forces recognition by markets, governments, and communities of the value of biodiversity and its contribution to sustainable economic growth. Biodiversity is certainly an example of how placing an economic value on a service can ensure that resources are conserved for generations to come.

Financial tools (such as incentives, conservation banking schemes, auctions, and revolving funds), combined with policy reform, can be utilized to appropriately value ecosystem services. Innovations in environmental finance are based on creating and realizing returns to natural capital. Paying farmers not to graze cows can maintain water quality at lower costs. Wetlands can act as buffers against floods and storms, and that has an economic value. Protecting and even showcasing rare plants and animals can increase ecotourism revenues. The right kind of flora and land use can provide fire protection and prevent soil erosion. Incentivizing behaviors such as planting native varieties, reducing the use of pesticides, and practicing no-tillage farming can increase agricultural productivity.

Consensus is forming between the public and private sectors to support the adoption of models and the necessary infrastructure to make sure that Israel's economic growth is sustainable in environmental terms. New industry growth and job creation are not incompatible with conservation. The time is ripe for the emergence of an ecosystem marketplace in Israel. New technology can now lower the costs of monitoring compliance and results, making regulation more effective, and tradability will open new avenues for innovative approaches. As David Zilberman of the University of California-Berkeley advised, we should build financial solutions that “innovate with care and build trust.”

It is clear that Israel is ready for strong legislative action that will have a lasting positive impact on the environment. By codifying good stewardship, Israel can ensure that delicate habitats and endangered species will survive and thrive for generations to come.

APPENDIX

Financial Innovations Lab Participants

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