

#### Comet-ME 2018 Annual Report

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An amendment recently enacted by the Israeli Knesset as part of the governmental campaign against Israeli civil society obliges us to point that most of the sources for Comet-ME's budget are donations from foreign governmental entities. Needless to say, we are proud to have on our list of donors democracies who share with us the belief that electricity and clean water are basic human rights for all people, and specifically for those living under military occupation.

Cover photo Ryan Brand

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**Photo** Ryan Brand

# **ABOUT US**

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## **WHO WE ARE**

Comet-ME is an Israeli-Palestinian organization providing basic energy and clean-water services to off-grid communities using environmentally and socially sustainable methods. We facilitate the social and economic empowerment of some of the poorest and most marginalized communities in the occupied Palestinian territories through the installation of renewable-energy and clean-water systems, along with the provision of reliable maintenance, monitoring, and management.

Our work has developed out of a long-standing relationship and commitment to the marginalized Palestinian communities in Area C—from our base in the south Hebron hills, throughout the southern West Bank, and into the Jerusalem-Jericho corridor. Initially a volunteer initiative, Comet-ME conducted its first installations in 2006 and formally incorporated as a public benefit company in Israel in September 2009. Today, we are a vertically integrated utility, providing basic energy services to 69 communities encompassing nearly 6,000 people. In 2013 we entered the field of off-grid water pumping and filtration solutions, and since then have brought our clean-water services to 250 households throughout our energy install base.

Since the establishment of our Center for Appropriate Technologies in the south Hebron hills in 2012, Comet-ME has been a daily presence in the lives of the beneficiary communities, responding to any issue—technical or social—that arises, and in this way establishing ourselves as a reliable and trustworthy service provider in the region.

Comet-ME is currently the leading provider of sustainable rural electrification services in the region and an innovator in the field of off-grid water technologies. Over a decade of experience in the field, we have seen how the provision of basic energy and water services to the marginalized communities in Area C has proven to be an effective means for community empowerment and economic development, helping communities remain and live in dignity on their lands.



**Photo** Ryan Brand

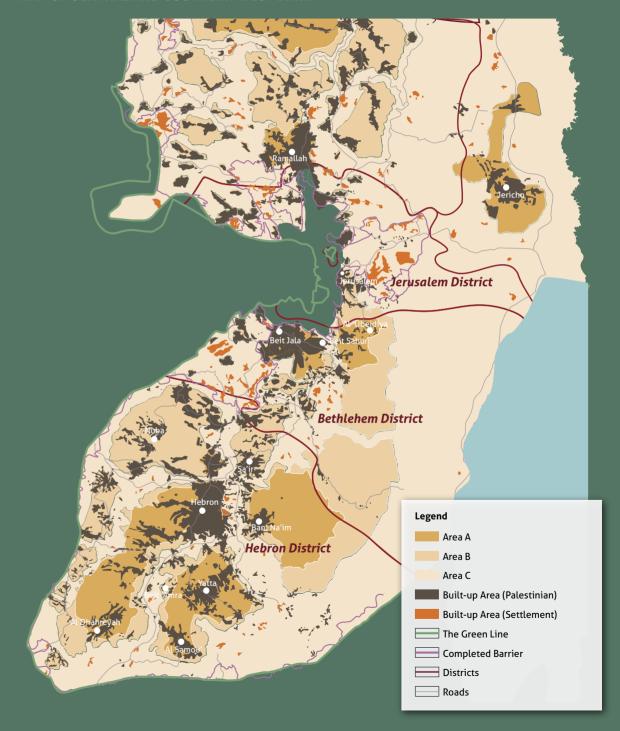
## WHERE WE WORK

Comet-ME works exclusively in Area C of the occupied Palestinian territories. Area C, as defined under the Oslo II accords, constitutes 62% of the West Bank and is under full Israeli military and civil control, including all matters pertaining to planning, construction, and development.

Area C is the only remaining land and agricultural reserves for a viable future Palestinian state and economy, but most of the land has been allocated for the benefit of Israeli settlements and the Israeli military. The discriminatory planning regime imposed by Israel, harassment and violence by settlers, and restrictions placed by the military, are tantamount to a policy aimed at pushing the Palestinian population out of Area C and into Areas B and A to make way for Israeli development and settlement expansion.



## MAP OF CENTRAL AND SOUTHERN WEST BANK





## TARGET COMMUNITIES

Comet-ME's work targets rural off-grid farming and herding communities in the southern and central West Bank. The inhabitants of these mostly arid regions subsist on non-mechanized agriculture and herding. The harsh climate is compounded by an extremely difficult political reality by which the communities live disconnected from all infrastructure, including on their lands and for the younger generation to access roads, electricity, and running water.

The lack of regular access to electricity means that the communities lack the most basic amenities, including refrigeration (of food, water, and medication), lighting, and telecommunications. Families must make several trips a week to nearby towns to charge cell phones, receive medication, and purchase food, in particular in the hot summer months. Without access to appliances such as butter churns, washing machines, and mechanical water pumps, the women in these communities spend hours a day at the tasks of producing dairy products, doing laundry, and carrying water from cisterns to their homes. The hours spent at manual labor mean fewer hours spent with their children, helping with homework, or simply engaging in leisure activities, both before and after dark.

Over Comet-ME's nearly a decade of experience in the field, we have seen how the provision of basic energy services to marginalized communities in Area C has proven to be an effective means for community empowerment and economic development. We have witnessed how access to basic services has enabled families to remain make their homes and start new families there.



**Photo** Ryan Brand

## **HOW WE WORK**

Comet-ME is a unique hybrid of technological start-up, development aid agency, and political grassroots human rights organization, while functioning day to day as a mini-utility for off-grid Palestinian communities in Area C. Comet-ME's Palestinian-Israeli team combines technological and technical expertise with project-management, organizational, financial, and community-outreach skills. Our work is based on the following principles:

## RENEWABLE ENERGY

The leader in rural electrification in the occupied Palestinian territories, Comet-ME designs, installs, and maintains renewable energy systems (wind and solar) that provide electricity 24/7, 365 days a year. Our renewable energy installations range in size from single-family systems to community-scale mini-grids, designed according to the needs and situation of each community. The energy systems provide 2.5 kWh/day/household—enough for illumination, refrigeration (of food and medicine), cell-phone charging, television, radio, and computers, water pumping, and use of basic appliances, in particular washing machines and butter churns.

## APPROPRIATE TECHNOLOGIES

We espouse a dynamic, needs-driven approach to our technological solutions, based on a uniquely short cycle of needs assessment, research and development, piloting, widescale implementation, and user feedback. The technological applications developed over the past decade include hybrid wind and solar systems that exploit of the unique climate of the south Hebron hills; demand-side management

and custom-designed Comet-MEters that encourage users to rationalize their own energy consumption; online diagnostics that allow us to monitor and identify problems as they arise; a custom-designed smart controller that channels surplus energy from the renewable energy systems to automatically power the water pumps in Comet-ME's household water systems; and a PVC bio-sand filter adapted from an open-source design by the Canada-based Centre for Affordable Water and Sanitation Technology and manufactured locally.

#### OPEN SOURCE

All technological details of our systems are available in the public domain. Our partnership strategy extends to a global network of practitioners. Sharing our experience with and benefiting from that of global partners, Comet-ME is part of a uniquely short loop of technology development and implementation. Thus, lessons learned in the south Hebron hills can serve communities in Africa, just as developments made in student labs in the US can find their way to the field within weeks.

#### LOCAL SOURCING

By investing in local West Bank tech infrastructure, we help develop local knowledge and practice in the field of renewable energy. Comet-ME procures inputs from local manufacturers whenever possible. We purchase components for installation and maintenance from suppliers in Yatta, Hebron, and Ramallah and contract with local workshops to manufacture some of the custom-designed components of our systems.



**oto** Ryan Branc



## COMMUNITY

Community participation and trust-building are integral to our approach. We invest in building a direct and long-term relationship with the community members, whom we consider both beneficiaries and partners. Our work model is based on substantial and meaningful community participation, ownership, training, and capacity-building at every stage of the process. Our team of Palestinian and Israeli engineers, project managers, and technicians trains local community members in basic maintenance and diagnostics, helping to develop a local knowledge base that serves as a source for future development.

Since our earliest installations dating back to 2008, we have been involved in the communities on a day-to-day basis—maintaining and monitoring the systems, connecting new households when children grow up and marry, upgrading systems to meet the growing needs of developing communities, building the capacity of community members, and accompanying many of the communities in ongoing legal campaigns to protect their systems from demolition.

Community participation and trust-building are of systems. Our center of operations is located in integral to our approach. We invest in building a direct and long-term relationship with the available to respond to issues as they arise.

#### BUY-IN PHILOSOPHY

Beneficiaries pay an electricity bill based on metered use according to the same tariff paid by grid-connected users in Palestine and Israel. Paying for electricity creates a sense of ownership and contributes to maintenance costs for the systems and to the eventual replacement of major components. Because usage is capped at 2.5 kWh/day/household, users pay no more than 40 ILS/12 USD per month, a manageable cost even for the most vulnerable families. Beneficiaries also make a contribution of about 7% of the cost of their water systems and 1/3 of the cost of the energy-efficient refrigerators that Comet-ME subsidizes as part of our energy installations.

#### SUSTAINABILITY AND SERVICE

Functioning as a mini-utility company for offgrid communities in Area C, Comet-ME ensures the sustainability of all of its past installations through reliable maintenance and management

Opposite page, above: One of a dozen vending points where users can refill their prepaid electricity meters.

Below: Comet-ME team members speaking with a resident. Through detailed house-by-house surveying we identify the energy and water needs of each household and design and deploy the systems accordingly.



**Photo** Waseem Alja'bari



**photo** Tomer Appelbaum





## **Photo** Ryan Brand

## 2018 ACTIVITIES REVIEW

## **ENERGY PROGRAM**

Lack of reliable access to electricity is a major hindrance to development in Area C and makes day-to-day survival difficult. Lack of refrigeration, whether for food, water, or medication, particularly in the hot summer months, requires frequent trips by car or on foot to the nearest town to buy food and receive medication. Basic activities, such as doing laundry, finishing homework after dark, and even charging cell phones, cannot be taken for granted. Moreover, the production of dairy products, a backbone of the local economy, requires hours of manual labor, in particular on the part of the women. Those who have partial access to electricity via diesel generators can spend hundreds of shekels a month for just a few hours a day of electricity, and they suffer from air and noise pollution next to their homes.

The implementation of Comet-ME's off-grid energy solutions in the communities over the past decade has had manifold humanitarian, economic, and social benefits. Those who experience the change in the most palpable and meaningful way are the women, who traditionally bear the brunt of the manual labor involved in the day-to-day tasks of maintaining the household and its economy—from carrying water, cleaning, cooking, and doing the laundry, to milking and producing dairy products for family consumption and sale.

The core activities of the energy program are the installation of renewable energy systems and regular monitoring and maintenance of all systems.

## **ENERGY INSTALLATIONS**

Comet-ME's renewable energy systems provide 2.5 kWh of energy per day per household, delivering electricity for basic illumination, refrigeration, operation of simple washing machines and butter churns, cell-phone charging, television, and water pumping.

In 2018, we installed 165 family-based solar energy systems and 4 community micro-grids, reaching a total of 210 households and 1,100 individuals in Area C. Comet-ME conducts all of the work inhouse, from the design of the systems, through procurement of supplies, to the installations themselves, training of community members, and integration of the families into our maintenance scheme in order to ensure the longevity of the systems and the services we provide.

Opposite page: After months of planning and preparation, including detailed needs surveys, design of the system, procurement, and internal wiring of the homes, the team goes out to the field for a few concentrated days to complete the renewable-energy installation: turning an empty room into the heart of a state-of-the art micro-grid and a bare rooftop into a power source to electrify 10 households, with the capacity to accommodate the community as it grows.

**Photos** Tomer Appelbaum











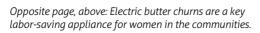








**Photo** Ryan Brand



Below: Balls of traditional dried yogurt for domestic consumption and sale.





**Photo** Ryan Brand

## MAINTENANCE PROGRAM

In order to ensure the long-term impact of our renewable-energy systems and services, Comet-ME implements an ongoing maintenance, management, and monitoring program, operated by our professional team of engineers, technicians, and community workers. The program has been developed over the course of several years and includes: regular diagnostics and online monitoring of systems, seasonal checks, rapid response to system malfunctions (through field visits, telephone service, or a combination of the two), upgrades of systems to meet the changing needs of growing communities, grid extensions to new homes, schools, and clinics, training of community members in proper use of the systems and in basic maintenance and diagnostics tasks, and a pre-paid metering and bill-payment scheme that contributes to covering maintenance expenses, rationalizes energy use, and fosters a sense of ownership among the users.

Our energy install base has grown significantly over the past several years, today reaching nearly 6,000 beneficiaries in over 850 households over a geographical area ranging from the southwestern tip of the West Bank to the Jerusalem-Jericho corridor. To keep up with this growth we are constantly honing our maintenance scheme and capacities, including implementing a vending scheme for pre-paid meter payment, providing telephone service to solve simple issues over the phone, and deploying our online logging and monitoring system to conduct diagnostics for community micro-grids so we can identify and fix problems before they occur.



Throughout 2018 we have continued to develop and deploy a custom-designed data-logging system for our microgrid installations. The system is a low-cost, easily deployable, open-source remote monitoring system for uploading data from Comet-ME's micro-grids to our server and presenting the data online on our website. The system serves us as a diagnostic tool to evaluate the health of the systems and detect problems before they occur.

**Photo** Ryan Brand



## **COMET-H20: WATER PROGRAM**

Access to water is one of the most acute issues facing impoverished off-grid rural communities in Area C. This is manifested, among other things, in insufficient water supply, inadequate delivery means, and poor water quality. The communities residing in the south Hebron hills, where Comet-ME has worked for the past decade, rely on rainwater harvesting and cistern storage for water supply, as do many Palestinian communities in Area C. Neither connected to the water grid nor permitted to build new or access many existing cisterns for rainwater harvesting, families often exhaust their water supply early in the summer and need to purchase water in tanks and transport it to their dwellings, the price they pay reaching 8 to 10 times the tariff for gridconnected users.

Rain runoff into the cisterns is contaminated with organic waste, impacting the quality of drinking water and the state of health in these communities, especially among children, the sick, and the elderly. And finally, because cisterns are not equipped with mechanized pumping capacity (due to the more general lack of electricity), water is drawn and carried manually, the burden of obtaining water for domestic use falling disproportionately on women and girls. The lack of proper delivery means increases the risk of water-borne diseases, endangering community health.

Comet-ME has developed and implemented its water program since 2013, building on our extensive experience in the renewable energy sector. The goal of the program is to provide comprehensive renewable-energy-based water services for communities struggling to survive in harsh climatic and political conditions. The core activities of the program are the installation of household pumping, storage, distribution, and filtration systems and regular monitoring of water quality.

In 2018, we installed 40 water systems, bringing our total water install base to 250 households and 6 schools, serving about 2,000 people.

The mechanical pumping and distribution of water from the cistern to taps in and around the home provides convenient access to water and vastly reduces the amount of time and labor dedicated to household water management. Multi-stage filtration, culminating in a bio-sand filter (BSF), installed in the kitchen of each home, brings microbiologically contaminated water to first-world drinking standards.

**Photo** Ryan Brand



## WATER-QUALITY MONITORING

Following installation of the water systems, the owners/users of the household water systems come under Comet-ME's water-quality monitoring scheme. Comet-ME's water lab technician visits the communities on a rotating and taking samples from the bio-sand filters. The water samples are then tested in Comet-ME's inhouse microbiology lab, and a weekly internal report is produced, comparing the latest results with previous results in each household. This enables us to observe the adjustment of the (such as following rainfall) and to determine whether localized treatment of the water is

necessary. By the end of Comet-ME's 2018 installations, our water monitoring program has reached 250 households throughout the south Hebron hills.

basis, reaching each community every 4-6 weeks During the course of 2018, Comet-ME initiated a capacity-building and awarenessraising campaign targeting the women in the communities. The goal of the campaign is ultimately to improve overall water quality by raising awareness to water-related health issues. We have chosen to target women specifically in bio-sand filters to changes in water quality input this project because they are the family members responsible for the upkeep of the bio-sand filters, which provide water for drinking and cooking.











Above: Comet-ME's public health researcher joins our water expert on his regular sampling visits to the communities, conducts a baseline survey among the women about their use of the bio-sand filters, helps them identify health risks related to drinking water contamination, and advises them about how to minimize the negative health effects through proper use of the filters.

Opposite page: Comet-ME's water expert testing water samples at the microbiology lab at the Comet-ME Center for Appropriate Technologies.

**Photos** Ryan Brand



## RESEARCH AND DEVELOPMENT

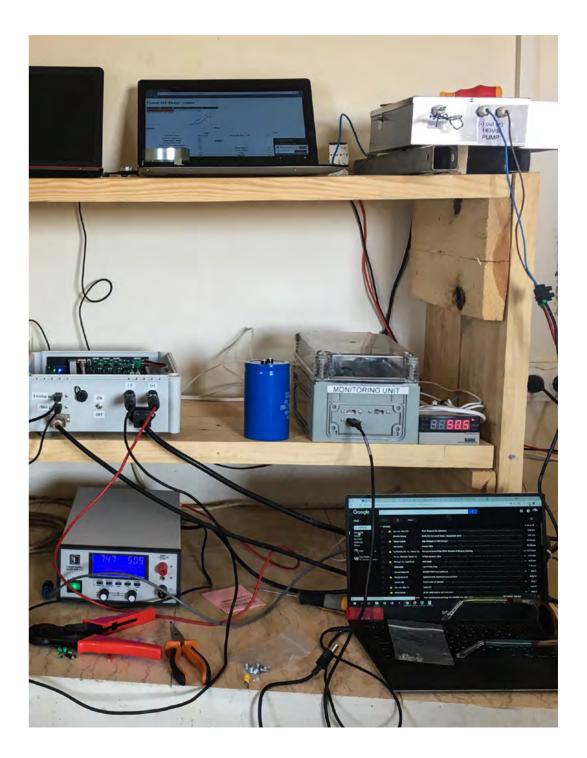
As an organization that is both highly technological and field-based, we are in a technology's promising possibilities. Our goal is to bridge this gap by developing appropriate technologies that are suitable to the capacities, resources, and needs of off-grid communities in developing areas.

## THE SOLAR MAGNETIC PISTON PUMP

Over the past year we have nearly completed technical development of our Solar Magnetic Piston Pump (SMPP), a simple, reliable, and lowcost solar-powered water pump that we believe

will offer a game-changing solution for the poorest off grid rural farmers and communities unique position to integrate real needs with in the Global South. We have developed an integrated monitoring system that provides a full set of parameters and data about the pump's performance. Results from accelerated life-cycle testing at the Comet-ME Center for Appropriate Technologies demonstrate an impressive performance envelope in comparison with leading solar water pumps on the market. As a result of this past year's technical development we are now ready to conduct pilot testing of the SMPP in its target geographical regions and markets.





## **LEGAL PROTECTION**

Lack of permitting and the threat of demolition are the most significant obstacles to rural development in the West Bank, including rural electrification and water projects such as Comet-ME's. Although couched in bureaucratic planning terminology, demolition orders and lack of permitting in Area C of the West Bank are in fact a direct result of the Israeli political agenda.

The Israeli authorities hinder development projects as part of a larger policy aimed at pressuring rural communities in Area C to relocate into Palestinian urban centers, thus securing Israeli demographic dominance in the only remaining land reserves of the West Bank. Palestinians in Area C are subject to Israeli military rule, which is separate from the legal system that applies within Israel proper. They do not possess political and civil rights in the legal system that is imposed upon them. The obstruction of projects providing energy and water services in Area C is thus a direct breach of Israel's obligation under international law to fulfill the basic needs of the occupied population.

Comet-ME has been fighting the threat of demolition of its systems by the Israeli authorities since 2012. To date, 18 Comet-ME micro-grids are under concrete legal threat, with more than 2,000 people depending on these systems for livelihood, lighting, refrigeration, and other basic needs.

## WATER AND ENERGY INFRASTRUCTURE TARGETED IN THE SOUTH HEBRON HILLS

The Palestinian villages in the Masafer Yatta region in the south Hebron hills, aka the 918 Firing Zone, have suffered heavily from the demolition of basic infrastructure over the past year. Under the guise of planning regulations, the military has blocked off access roads to the desert communities, destroyed a water pipeline, demolished and confiscated numerous shelters for humans and animals, and also targeted the small energy and water infrastructure provided by Comet-ME and others. The Israeli military, as the occupying force in the region, is obligated not only to the building and planning regulations in the area but primarily to the principles humanitarian and international human rights law that govern occupation. Israel has failed for decades to fulfill the basic water and energy needs of the communities throughout Area C.

By installing renewable energy systems and water systems, Comet-ME has helped fulfill a need that was neglected by Israel and its military. The demolition of these humanitarian structures is thus in clear contravention of international law. In two incidents over the course of the year, Comet-ME water tanks have been demolished and family-based solar energy systems seized. Thanks to joint legal and diplomatic work, we have managed to retrieve the seized equipment and restore power to the affected families.



Al-Mirkez, Masafer Yatta, 918 Firing Zone, May 2, 2018. A man sits alongside the rubble of his home and a water tank following a demolition by the Israeli Civil Administration.

**Photo** Asmahan Simry

## **REACHING OUT**

Comet-ME generally keeps a low public profile, focusing more on our day-to-day work on the ground. However, when the opportunity arises communities we work in, the challenges they

face, and how our work fits in to the struggle against occupation and inequality in the occupied Palestinian territories, while also sharing and we are happy to spread the word about the learning best practices in the field of renewable energy and water.



In November 2018. Comet-ME was awarded the European Solar Prize in the category of "One World Cooperation," for its "outstanding commitment in the field of renewable energies." General Manager Elad Orian attended the awards ceremony in Bonn, Germany to receive the prize on behalf of Comet-ME. The European Solar Prize was awarded by EUROSOLAR, the European Association for Renewable Energy.

**Photo** copyright EUROSPLAR e.V. CC BY-NC-SA



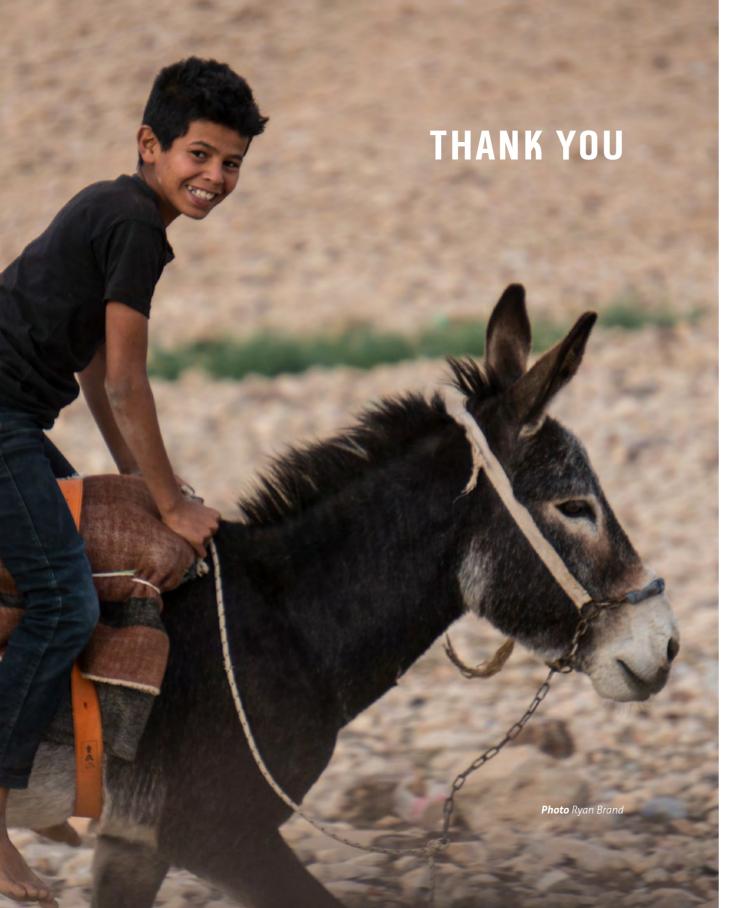
In March 2018, children and parents from the Arab-Jewish bi-lingual school in Jaffa paid a visit to the south Hebron hills to learn about Comet-ME's work and the communities we work in. In this picture, children gather around a cistern to see how rainwater has been collected by families in the area for hundreds of years.

**Photo** Asmahan Simry



A delegation of young Dutch politicians on a visit to a Bedouin community in the Jerusalem area to hear about the challenges these communities face and what Comet-ME's work does to support them.

**Photo** Asmahan Simry



Comet-ME is grateful for all the local and international donors, partners, research institutions and individuals who have made our work possible through support, advice, and collaboration.

#### **Donors**

Netherlands Ministry of Foreign Affairs German Foreign Ministry British Consulate General Jerusalem Irish Aid DanChurch Aid/Norwegian Church Aid Osprey Foundation Rockefeller Brothers Foundation Swiss Olive Oil Campaign Firedoll Foundation

And to all the individual donors who have supported our work and placed their trust in us. Special thanks to our US-based fiscal sponsor, The Center for Emerging Futures

#### Sharing the challenge

Association for Civil Rights in Israel
Bimkom – Planners for Planning Rights
Breaking the Silence
CESVI
Ecumenical Accompaniment Programme in Palestine and Israel (EAPPI)
Haqel – Jews and Arabs in Defense of Human Rights
Jahalin Solidarity
Kerem Navot
Michael Sfard Law Office
Ta'ayush

#### Sharing knowledge

CAWST – Centre for Affordable Water and Sanitation Technology DelAgua Group Hugh Piggott and Scoraig Wind Wind Empowerment Association

## **GET INVOLVED**

Our work is made possible through the generous donations of friends and supporters. Please consider supporting our work by making a donation at comet-me.org/donate/

Comet-ME is always looking for supporters, partners, and volunteers. Sign up for our newsletter or just get in touch at info@comet-me.org

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