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United Nations Peacekeeping Operations: Environmental Sustainability

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CENTER FOR TECHNOLOGY AND NATIONAL SECURITY POLICY

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Executive Summary

United Nations Peacekeeping Operations (UNPKO) are deployed to create, maintain, and secure peace in countries and regions struggling with violence and war. The environmental sustainability of UNPKO mission sites is not essential to the purpose of each deployment, but good sustainability practices can benefit the mission, host nation, troop-contributing countries, and the global environment. As a major contributor to UNPKO efforts, the United States has a direct interest in improving the sustainability and cost-effectiveness of each mission.

This paper identifies gaps in sustainability practices at local and organizational levels and recommends an increased focus on sustainability practices that can benefit the mission, host nation, troop-contributing countries, and the environment.

The United Nations Interim Force In Lebanon (UNIFIL) is a long-term mission, likely to be in place for at least another five years. Investments in active technologies such as solar energy and electric vehicles are already paying dividends. Expansion of these programs, as well as standardized environmental awareness training and improvements to UNIFIL's water management practices would enhance the sustainability of the mission.

The United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) is a relatively recent mission, staffed with a high proportion of illiterate peacekeepers, in a politically unstable country with a harsh natural environment. Although required by Security Council resolution to manage its environmental impact, MINUSMA lacks the financial resources, manpower and timeline to invest in complex technologies with up-front cost. To comply with its environmental mandate, the mission should implement short-term, passive measures to improve water management and solar/thermal protection, as well as standardized environmental awareness training. If the situation in Mali stabilizes and MINUSMA is extended to a longer mandate, then the mission should follow the lead of UNIFIL and implement active technologies that are environmentally friendly and will save money over the life of the equipment.

All of these recommendations can be applied, to some extent, to all UNPKO deployments. UN headquarters should take the lead in standardizing environmental training, technology and practices for all

UNPKO missions. Cost-benefit calculations will always be important, but the overall benefit of good sustainability practices will extend to people and the environment from the local to the global level.

Introduction

United Nations Peacekeeping Operations (UNPKO) are deployed to create, maintain, and secure peace in countries and regions struggling with violence and war. The environmental sustainability of UNPKO mission sites is not essential to the purpose of each deployment, but good sustainability practices can benefit the mission, host nation, troop contributing countries, and the global environment. As a major contributor to UNPKO efforts, the United States has a direct interest in improving the sustainability and cost-effectiveness of each mission.

The UN Environment Programme (UNEP) in collaboration with the United States Department of Defense (DOD) created the UNPKO Sustainability Solution Analysis project¹ to examine UNPKO environmental processes in general, as well as operational methods at specific mission sites, to develop recommendations for relevant, effective and lasting improvements to sustainability. The term sustainability is used to describe processes and technologies that are cost-effective and environmentally friendly, as well as reducing the logistical footprint and impact on local populations.

For the purpose of this study, the project team analyzed sites at the United Nations Interim Force In Lebanon (UNIFIL) and at the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA). The following UN documents provided a framework for the analysis:

- Greening the Blue Helmets: Environment, Natural Resources and UN Peacekeeping Efforts²
- Promotion of new and renewable sources of energy³
- Progress towards the Sustainable Development Goals⁴
- Development, transfer and dissemination of clean and environmentally sound technologies⁵
- Annual Statistical Report On United Nations Procurement⁶
- UNEP Guide for Energy Efficiency and Renewable Energy Laws⁷
- Community Protocols for Environmental Sustainability: A Guide For Policymakers⁸

Institution-Wide Gaps in the Context of Sustainable Development Goals

Review of the UN documentation revealed UNPKO-wide gaps in training, lack of incentives for environmental awareness, and inadequate data collection. From a non-material perspective, the documentation showed a lack of comprehensive pre-deployment training on the use of natural resources and environmental considerations.

There is a general lack of support for sustainable technologies if they involve additional cost, even low-cost passive technologies that do not require training or maintenance⁹, such as blinds, sunshades, window tinting, and metering to monitor energy consumption of heating, cooling, lighting and small generators.

Further analysis of the UN documentation showed room for improvement in three key areas: fresh water; waste management; and UN structure and processes as outlined below.

Fresh Water

Potable water is usually scarce in regions with active UNPKO mission sites. Water wells are often the main source of water. Water is drawn from the well and passed through a filtration system or a reverse osmosis (RO) system to make it safe for drinking, cooking and showering.¹⁰ UN base camps that lack confidence in the quality of well water use bottled water for drinking and cooking.

Production and disposal of plastic bottles is contrary to the principles of environmental sustainability. Transportation of bottled water is expensive, hazardous and detrimental to the environment. Pallets of bottled water are usually trucked to UN mission sites and sometimes air-transported at great expense. Truck transportation via sometimes dangerous supply routes presents a safety risk to the drivers and a security risk to the supply of drinking water. Directly or indirectly, the UN pays for the energy consumed during all phases of water extraction, purification, packaging, transportation and disposal.

Waste Management

Non-hazardous solid waste from 60% of UN base camps is collected by solid waste contractors. The ultimate disposal process for the waste is often unknown. 30% of UN base camps have official landfill facilities, but lack of guidance on whether the landfill should be lined or unlined can result in significant

impact on the local environment. 10% of UN base camps routinely bury non-hazardous waste when designated landfill sites are not available.¹¹ Special waste disposal, including hazardous waste and medical waste, is outsourced to contractors.

Wastewater at most UN basecamps is handled using septic tanks and modular wastewater treatment plants. At some locations, wastewater is transported outside of the base camps using sewage tankers and discharged into the local municipal wastewater treatment plant or into a wastewater lagoon. Municipal wastewater treatment plants often lack sufficient capacity and require upgrade and improvement to accept UN wastewater. Wastewater lagoons can sometimes overflow into local watercourses during and after heavy rains.

Inadequate local waste management facilities result in UN camps creating additional waste management systems. This situation is costly and time consuming, and it makes the mission site more entrenched in the local community.

UN Structure and Processes

Currently there is no environmental training standard for UN peacekeeping forces and peacekeeping police during induction training. There is a UN-specific environmental compliance unit deployed at the field level but the small staff of dedicated personnel is not adequate for managing compliance and traveling to all mission sites and regions.

The UN procurement process is slow and bureaucratic, but showing signs of improvement in terms of encouraging sustainability. Funding of UN organizations is generally large enough to influence sustainability by increasing the number of environmentally aware vendors and prioritizing those with sustainable methods. The number of UN organizations reporting impediments to sustainable procurement decreased from 32% in 2015 to 28% in 2016. 64% of reporting organizations had either already adopted or were planning to adopt a sustainable procurement policy, while 54% had either implemented or were planning to implement a sustainable procurement strategy.¹²

One of the biggest obstacles is the perceived expense of buying and implementing sustainable options. Utilizing a whole-of-life costing approach in financial evaluations of procurement requests would be a step in the right direction. This approach assesses the cost and the savings for the lifespan of the technology, rather than just acquisition and start-up costs, and often proves that sustainable technology is more economical in the long term.

Most pre-deployment readiness activity is, understandably, focused on operations and logistics rather than enhancing deployment sustainability. Likewise, operational staff are focused on short-term solutions rather than the longevity of the deployment.¹³ One consequence is that troop contributing countries (TCC) are not coordinated to optimize the respective contingents in terms of sustainability and environmental impact.

The UN Security Council recently passed a resolution that put a ceiling on the number of troops that can be deployed at any given time. This cost reduction measure could reduce the environmental footprint of peacekeeping operations overall, but the ceiling also reduces the likelihood of including environmental officers for identifying and implementing sustainable processes and technologies.

How do specific mission sites function?

Each UNPKO mission site is unique. The research team developed a comprehensive snapshot of the UNIFIL and MINUSMA mission sites by examining the respective mission background, including its history and mandate, the kinds of sustainable technology at the mission site, the regional and host country politics, and the relevant TCCs. Analysis of the mission sites provided a basis for determining the most appropriate approach to sustainability using the following framework:

- Long-term technology, in place for at least five years
- Short-term technology, in place for up to five years
- Active technology, requiring training for operations and maintenance
- Passive technology, requiring no training and little maintenance

Lebanon and UNIFIL

The UN Secretary General's report in March 2017 concluded that while the UNIFIL mission has good relations with the Lebanese government, the situation on the border remains unstable and prone to continued conflict.¹⁴ The Strategic Review of UNIFIL, also in March 2017, concluded that while the Blue Line remains calm, there is virtually no progress towards a long-term cessation of hostilities. Both reports indicated a high probability that UNIFIL will remain in place for at least five more years.¹⁵ Accordingly, the mission could accommodate technologies that will deliver more cost-effective sustainability options in the longer term.

The Lebanese National Report on sustainable development goals, published by the Department of Economic and Social Affairs at the UN in 2012, provides insight into the Lebanese government's priorities relating to energy and water.¹⁶ Given these perspectives, UNIFIL could take the initiative and engage the Lebanese government in exploring mutually beneficial opportunities for environmental sustainability.

Environmental Issues across Lebanon

According to the Lebanese National Report, the nation's ecological footprint of 3 global hectares (GHA) per capita exceeds the bio-capacity of the regional environment (0.5 GHA/capita), making it unsustainable in the long term. In this context, Lebanon and UNIFIL face two main environmental challenges.

Firstly, Lebanon relies heavily on aquifers that are vulnerable to contamination. According to the same report, available water in Lebanon is measured at 1,100 meter³/capita/year. The definition of water stress is 1,000 meter³/capita/year, so Lebanon is close to the stress level.¹⁷ Barely sufficient water is received through streams, rainfall and snow melt, but pollution and lack of infrastructure make it difficult to distribute and often unsafe for consumption. Resulting water shortages lead to water being pumped from aquifers. Agricultural irrigation uses 61% of the country's water supply with very low efficiency, often using wasteful open channels systems. Despite increased investment in water distribution infrastructure by the Lebanese government, 50% of the transmission and distribution pipelines suffer from leaks.

With almost no industrial wastewater treatment facilities, most wastewater is pumped into the environment where it can pollute the limited ground water sources. The Lebanese government published a ten-year plan in 1999 to build 17 dams and lakes across the country to increase the drinking water supply, and to decrease the stress on the environment due to wastewater. To date, just one dam has been built. The government has not started work on the other 16 dams due to lack of funds, technical issues, and leaks in the first dam. To help decrease the water stress on the local communities, UNIFIL headquarters connected the local town, Naqoura, to its water treatment system, making it the first village in the south of Lebanon to have a proper sewerage system. Funding was provided by Quick Impact Project, a grant program that UN mission sites can access to assist the local community.¹⁸

Secondly, Lebanon lacks a green economy. Government authorities recognize the need to increase sustainability in protocols and procedures. To this end they have begun lowering tariffs for importation of green techniques and sustainable technologies, and they are increasing the number of “green jobs,” defined as jobs to help ecosystems, protect biodiversity, reduce consumption, and de-carbonize the economy.¹⁹ UNIFIL is an important contributor to the sustainability goals of Lebanon. Connecting the local water treatment facility to UNIFIL’s system, and showing support for the government’s goals by making UNIFIL operations environmentally sustainable, should create a long-term positive impact.

Sustainable Technology at UNIFIL

The four major types of sustainable technology in operation at UNIFIL are as follows: photovoltaic (PV) solar panels; electric cars; efficient generators and cooling systems; and waste management.

The PV panels on the roofs of buildings became operational at UNIFIL in 2010. 70% of the energy requirement for the Information and Communication Technology Services (ICTS) building is now provided by solar energy, which saved \$6,301 within the first three months.²⁰ This aligns with several other UNPKO missions that are using PV solar units on a limited scale, including United Nations Integrated Mission in Timor-Leste (UNMIT), United Nations Stabilization Mission in Haiti (MINUSTAH), and United Nations Organization Stabilization Mission in the Democratic Republic of Congo (MONUSCO).

Ten electric cars are currently in use at the UNIFIL headquarters in Naqoura. The cars have solar units that allow charging during operation, enabling them to travel farther than cars with traditional recharging units. There is no monitoring data available for the electric cars, but qualitative assessments such as Greening the Blue Helmets, and UN Peacekeeping In Lebanon: A Case Study²¹, indicate improved sustainability of the mission site.

UNIFIL is introducing energy-efficient generators and centralized cooling systems. The new generators use Hydraulically Activated Electronically Controlled Unit Injector (HEUI) Systems which reduce smoke and fuel emissions by 20% through monitoring and injecting only the necessary amount of fuel. Power monitors are used on the generators to determine high and low demand times, thereby enabling a reduction in the number of generators in operation during low times. The new centralized cooling systems are designed for two multi-story hard-wall buildings, replacing 160 individual air conditioning units in the same buildings. Central control enables adjustment to conserve energy during off-peak times.²²

Waste management at UNIFIL is based on a landfill site that was constructed in 2010. The site separates recyclables for delivery to a recycling plant. Additionally, a leachate and methane collection system was implemented and top soil was replaced to allow for the restoration of vegetative cover and planting of 1,200 trees. Activity at the landfill site is not monitored so the impact on sustainability is not known, but its existence demonstrates a commitment to sustainability at the mission.

Troop Contributing Countries at UNIFIL

In mid-2017, 10,503 peacekeepers from 40 countries were deployed in Lebanon. Indonesia was the largest contributor with 1,296 troops. All Indonesian troops attend the National Army Peacekeeping Training Center before deployment.²³ This creates a standard of foundational knowledge and procedural protocol that is rare in TCCs.

India has maintained a UNPKO presence in Lebanon since 1998. In mid-2017 it had 899 troops at UNIFIL, sustaining one infantry battalion and a level II hospital.²⁴ Ireland had 378 troops in-country and filled leadership positions at UNIFIL.²⁵ It has a UN training school dedicated to training Irish soldiers for

peacekeeping operations, including pre-deployment and mission readiness training in military and humanitarian aid.

Nepal had 869 troops at UNIFIL.²⁶ It has one of the largest and most intensive training programs, hosting almost 6,000 troops annually from a variety of UN member nations. The program delivers two types of training: the Critical Enabler and Capability Enhancement training program; and the Birendra Peace Operations Training Centre.

The Critical Enabler training program teaches basic understanding of the roles of military police, basic medical care, counter Improvised Explosive Device (c-IED) and Explosive Ordnance Disposal (EOD) skills, and a basic understanding of military command, control, communication, and intelligence.²⁷

The Birendra Centre is one of the largest of its kind. It provides a 90-day program of pre-deployment training that includes combat fitness, weapon conversion training, basic military skills, peacekeeping operations training, mission specific training, and a field training exercise. The Center offers specialized training modules for the duties of military observer, peacekeeping operations instructor, staff officer, logistics officer, civil military liaison officer, and peacekeeping operations contingent commander.²⁸

Neither the Critical Enabler and Capability Enhancement training program or the Birendra Peace Operations Training Centre includes an environmental training component.

Mali and MINUSMA

The crisis in Mali stems from long standing structural problems such as weak state institutions, ineffective governance, fragile social cohesion, a weak and externally dependent civil society, climate change, and economic shocks.²⁹ In April 2013 UN Security Council Resolution 2100 established the MINUSMA peacekeeping mission to support political processes in Mali and to carry out security related tasks, mainly supporting the transitional authorities with stabilization efforts.³⁰ A subsequent resolution in June 2014 expanded the mission mandate to focus on ensuring security, stabilization and protection of civilians, supporting national political dialogue and reconciliation, assisting the reestablishment of state authority, rebuilding the security sector, and promoting and protecting human rights.

In June 2017 the UN extended the mandate for MINUSMA to include the following responsibilities: support, monitor, and supervise implementation of the ceasefire agreements; support implementation of the Agreement on Peace and Reconciliation in Mali including political and institutional reform; exercise good offices, confidence-building and facilitation at the local and national levels; protect, civilians under imminent threat of physical violence; assist the Malian authorities in their efforts to promote and protect human rights; contribute to the creation of a secure environment for the safe, civilian led delivery of humanitarian assistance; protect UN personnel, particularly uniformed personnel, installations and equipment; and assist Malian authorities in protecting cultural and historical sites from attack.³¹

MINUSMA is the first significant UN peacekeeping contingent mandated to help the state regain control over areas contested by terrorist groups. It is also the deadliest ongoing peacekeeping operation in the world with 118 peacekeepers killed in the first four years of deployment.³² Despite this dangerous context, MINUSMA is also the first peacekeeping operation to be required by Security Council resolution to manage its environmental impact.

Environmental Issues across Mali

With only 18% of the population having access to electricity, Mali has one of the lowest rates in Africa. Inadequate food security, compounded by inefficiencies due to a lack of access to electricity, have contributed to environmental degradation. Much of the available electricity is generated with petroleum-based fuels, especially in sparsely populated areas where an electricity grid is not a viable option.

The government of Mali and the UN have prioritized both issues for corrective action. Mali has established environmental goals to reduce greenhouse gas emissions from the agriculture sector by 29% and the energy sector by 31%, and to promote climate-smart agriculture, renewable energy and integrated management of water resources. The UN Environmental Programme is working with the Climate Technology Centre on the design and financing of crop drying and storage technologies to strengthen food security.³³ For example, installation of solar-powered processing and storage technologies will improve productivity and resilience of fruits and vegetables, allowing farmers to lengthen the shelf life of products and increase the quantity available for sale.

MINUSMA is working with AFFORD, a UK-based non-governmental organization (NGO), to provide solar kits to help supply the region with energy. This kind of effort sends a message at a local and regional level that MINUSMA intends to have a positive environmental impact.

Sustainable Technology at MINUSMA

The short-term nature of MINUSMA's mandate does not encourage longer-term investments in sustainability. With the current mandate expiring in June 2019, and pending annual renewal by the Security Council, any implementation of sustainable technologies must yield short-term cost savings and be easily removable in the event of a UN withdrawal from Mali.

MINUSMA personnel have conducted over 40 visits to sites across the country to observe the management of solid and dangerous waste, energy, water, wastewater, and flora and fauna. MINUSMA uses some renewable energy to reduce dependence on vulnerable fuel resupply convoys, but the mission is far from being energy independent. Recommendations derived from those visits are partially based on issues raised by the Secretary General's report on the situation in Mali published in June 2017.³⁴ The investigators noted significant gaps in military capabilities at the site, including a shortage of 88 armored personnel carriers and insufficient contingent-owned equipment and self-sustainment capabilities of some infantry units. Compared with the security imperative of military equipment, the deployment of sustainable technologies that require manpower resources and funding to operate would be a low priority.

Troop Contributing Countries at MINUSMA

In mid-2017, 10,710 uniformed peacekeepers and 1,342 civilian personnel were deployed in Mali with MINUSMA.³⁵ Of the seven countries that contributed over 800 troops, six are neighboring states accounting for 75% of the total force. As indicated in Table 1, these countries have an average literacy rate of 44.2%.³⁶ Illiterate peacekeepers cannot complete training modules that involve written instructions, and Mali's low literacy rate further limits the capacity for peacekeepers to communicate with the local population.

Table 1: National Literacy Rate for MINUSMA TCCs

Nation	Number of Troops	National Literacy Rate
Bangladesh	1,818	61.5%
Burkina Faso	1,855	36.0%
Chad	1,423 (MINUSMA leadership)	40.2%
Guinea	883	30.4%
Niger	896	19.1%
Senegal	869	55.7%
Togo	1,230	66.5%
Mali	Host country	38.7%

Comparison of UNIFIL and MINUSMA

The UNIFIL and MINUSMA missions both have European-based management structures, and both are located in regions of political and military instability. The UNIFIL deployment to Lebanon has been in place much longer than MINUSMA, and has been able to take a longer-term approach to sustainability issues. The Lebanese government, and the nation as a whole, has begun moving toward sustainability.

The government in Mali is pre-occupied with existential political and security issues rather than environmental degradation. The UN has encouraged Mali to consider sustainability issues by including an environmental component in the MINUSMA mandate. In terms of training and procurement, MINUSMA has other disadvantages when compared to UNIFIL, as outlined below.

Training

All UNPKO troops must complete UN training programs that are pre-deployment and mission-specific. Online training modules are available during deployment, but the utilization rate and efficacy varies for a variety of reasons, including the literacy and education standard of the peacekeepers. Most UNIFIL troops are trained in Nepal or Ireland on UN procedures and mission-specific syllabi. They tend to be better educated than MINUSMA troops because their countries of origin tend to have better education standards. As a result, UNIFIL peacekeepers are able to handle more complex types of training and technology, including active technologies for environmental sustainability.

Procurement

All UNPKO missions are required to use a common UN procurement division. The process is bureaucratic and slow, which deters mission sites from requesting new or additional technology, especially if it is not urgent or vital to the security of the site. Over time, UNIFIL has acquired some sustainable technologies, with vendors approved in the UN procurement system. Without the longer timeframe of UNIFIL, MINUSMA has not had the same opportunity. With the right motivation UNIFIL could request similar products from the same vendors, but budgetary and procurement processes will remain complex and slow and a disincentive to developing long-term sustainability.

Recommendations

The following recommendations address materiel (physical) and non-material (process) elements of the MINUSMA and UNIFIL missions. Most of the recommendations apply to the environmental sustainability and cost-effectiveness of UNPKO deployments in general.

Materiel Recommendations

Expansion of Current Technology

UNIFIL could reduce its energy consumption, resulting in obvious environmental and financial benefits, through the following measures:

- Increased use of solar panels beyond the headquarters
- Increased use of solar-powered electric vehicles
- Optimized use of all generators by manual switch-off during periods of low demand, or by installation of an automatic load-balancing system
- Continued support of the newly installed technical landfill at UNIFIL headquarters and expansion to add technical landfills beyond the headquarters
- Increased funding of Quick Impact Projects to support wastewater treatment plants at UNIFIL and in Lebanon

Depending on the scale of acquisition and installation, these active technologies would involve up-front costs. The process could be expedited because vendors have been approved through prior acquisitions, and little additional training or maintenance burden would be incurred.

MINUSMA has no active technologies for environmental sustainability in place so there is no basis for expansion.

New Technology Implementation

Agriculture takes up 60% of Lebanon's water supply. If UNIFIL were to replace its current irrigation equipment with a low-cost drip irrigation system, it would become more sustainable and impose less demand on limited local resources, while demonstrating a better approach for the host government.

MINUSMA is not well positioned in terms of budget or manpower to implement complex active technologies to reduce environmental impact. Over the longer term, timed energy efficient generators and cooling systems should be considered when existing systems are due for replacement. When the budget allows, MINUSMA should install PV panels as used by UNIFIL and other UN missions.

In the short term, passive technologies such as sunshades, water efficient showerheads and dual flush toilets, water tap regulators, and more efficient insulation could be installed to reduce operating costs. Such improvements would not impose an additional burden on the troops, leadership, budget or safety of the site.

Consumption awareness stickers should be placed on everyday items such as paper towel dispensers, sinks, toilets and showers. The UN Integrated Mission in Timor-Leste (UNMIT) installed stickers on vehicles and saw a 15% drop in energy consumption over 12 months. Stickers are cheap and simple to implement, and they are particularly useful at mission sites with language and literacy issues.

MINUSMA would benefit from automated metering tools to monitor consumption of water, energy, and generator fuel, thereby increasing awareness of operating costs. More broadly, all UNPKO mission sites could use automated metering to monitor operating costs and to measure the cost-effectiveness of active and passive sustainability technologies when implemented.

Non-Materiel Recommendations

Recommendations for non-materiel improvements at UNIFIL and MINUSMA would also apply to all UN peacekeeping missions. Firstly, the UN should simplify and standardize environmental awareness training for all peacekeepers. The training modules should be easily accessible, and should be supported by manuals that are readily available at each mission site to ensure reinforcement and retention of environmental awareness training through application in daily activities.

Secondly, the UN should consider an annual conference on global peacekeeping needs. The agenda could include discussions about improving and tracking the sustainability of UNPKO missions. Open discussion would encourage cost-effectiveness and standardization, while identifying the bureaucratic processes that inhibit progress toward sustainability.

Finally, the UN could mandate a standardized self-assessment process to encourage sustainability at each mission site, including implementation of automated metering and monitoring tools to increase awareness of environmental usage factors before and after technology implementation. This approach would benefit the UN and the host country, as well as raising the environmental awareness of deployed teams before they return to their respective TCC.

Conclusion

This paper identifies gaps in sustainability practices at local and organizational levels and recommends increased focus on good sustainability practices that can benefit the mission, host nation, troop contributing countries, and the environment.

UNIFIL is a long-term mission, likely to be in place for at least another five years. Investments in active technologies such as solar energy and electric vehicles are already paying dividends. Expansion of these programs, as well as standardized environmental awareness training and improvements to UNIFIL's water management practices would enhance the sustainability of the mission.

MINUSMA is a relatively recent mission, staffed with a high proportion of illiterate peacekeepers, in a politically unstable country with a harsh natural environment. Although required by Security Council

resolution to manage its environmental impact, MINUSMA lacks the financial resources, manpower and timeline to invest in complex technologies with up-front cost. To comply with its environmental mandate, the mission should implement short-term, passive measures to improve water management and solar/thermal protection, as well as standardized environmental awareness training. If the situation in Mali stabilizes and MINUSMA is extended to a longer mandate, then the mission should follow the lead of UNIFIL and implement active technologies that are environmentally friendly and will save money over the life of the equipment.

All of these recommendations can be applied, to some extent, to all UNPKO deployments. UN headquarters should take the lead in standardizing environmental training, technology and practices for all UNPKO missions. Cost-benefit calculations will always be important, but the overall benefit of good sustainability practices will extend to people and the environment from the local to the global level.

Notes

¹ The UNPKO Sustainability Solution Analysis project is a collaborative effort by the UN Environment Programme (UNEP), US Africa Command (AFRICOM), US Army Construction and Engineering Research laboratory (CERL), and the Center for Technology and National Security Policy (CTNSP) at the US National Defense University (NDU).

² UNEP. *Greening the Blue Helmets: Environment, Natural Resources and UN Peacekeeping Efforts*. Policy Paper, Nairobi: United Nations Environment Programme, 2012.

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²¹ Murphy, Ray. "UN Peacekeeping in Lebanon: A Case Study." *International Relations and Security Network*, Swiss Federal Institute of Technology, Zurich, 2008.

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²⁹ UN Security Council. "Report of the Secretary-General on the situation in Mali" 2017.

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