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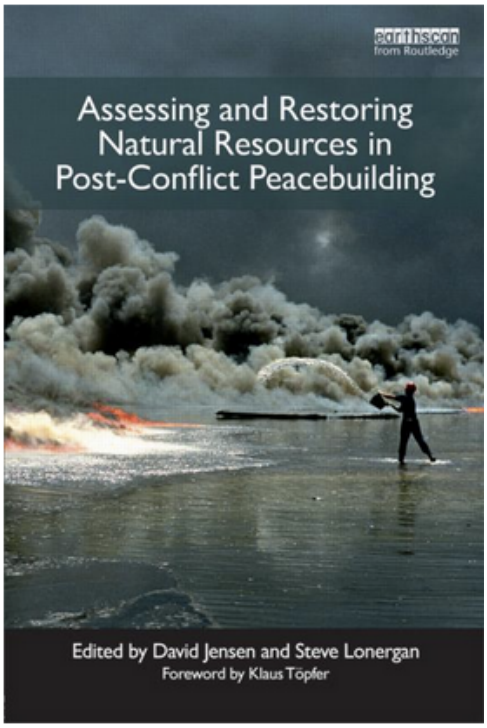

Medical and environmental intelligence in peace and crisis-management operations

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Medical and environmental intelligence in peace and crisis-management operations

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Deployed personnel in peace and crisis-management operations regularly face an environment that has been negatively affected by the consequences of conflict (Waleij et al. 2005; UNEP 2009). Environmental challenges to such operations have three important aspects: first, potential environmental risks to the health of deployed personnel must be identified and mitigated; second, the overall operation must not cause further damage to the environment; and third, environmental drivers of the conflict or crisis, as well as potential flashpoints that may undermine mission security, must be understood.

Since 2001, the Swedish Armed Forces and the Swedish Defence Research Agency have collaborated on developing tools that facilitate medical and environmental intelligence and, more recently, analyses of environmental vulnerabilities, guided by the notion that environmental considerations and health protection for deployed personnel are two sides of the same coin.[1] This chapter provides a short

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[1] Some of the geographical areas Sweden has studied include the Aceh Province in Indonesia (Waleij et al. 2005); Afghanistan (Berglind et al. 2002; Edlund, Liljedahl, Waleij, et al. 2004; Liljedahl et al. 2007); Bosnia and Herzegovina (Waleij, Edlund, Eriksson, et al. 2004); Burma, or Myanmar (Swedish Armed Forces Medical Intelligence 2008a); Chad (Swedish Armed Forces Medical Intelligence 2008c); the Democratic Republic of the Congo (Edlund, Follin, et al. 2003); Haiti (Liljedahl 2010); Kosovo (Edlund,

overview of developments within the field of Swedish medical and environmental intelligence and of one of the tools that has been developed, the environmental vulnerability assessment (EVA). The chapter proceeds with a brief discussion of how EVAs have contributed to decision making for Swedish peace and crisis-management operations, and concludes by emphasizing the need for participants in international peace and crisis-management operations to systematically share and coordinate environmental intelligence.

MEDICAL AND ENVIRONMENTAL INTELLIGENCE

Intelligence within the military is a product of a four-phase process: collection, analysis, processing, and dissemination. Intelligence activities are conducted at all levels, from tactical to operational and strategic, and may include a variety of areas of interest.

An overall intelligence assessment can be broken down into a number of components, including medical and environmental intelligence. Developers of each intelligence component conduct their business according to defined structures and functions. In Sweden, environmental intelligence is carried out within the broader framework of the Swedish Armed Forces medical intelligence component.

Deployed personnel may encounter multiple health risks that are not related to combat.[2] These include exposure to toxic substances like mold and asbestos, to chemicals and radiation in damaged civilian industrial facilities, to inadequate sanitary conditions, and to open-pit burning of waste (Waleij et al. 2006; Waleij, Göransson Nyberg, et al. 2011). The mission itself will add to the overall sources of potential hazard exposure, including jet fuel, petrol and diesel fumes, repellents, explosives, and munitions (Wingfors et al. 2007). In addition, personnel may encounter health risks from environmental conditions in the theater of operations, such as endemic diseases, naturally high dust levels, and extreme temperatures (Westholm et al. 2008; see table 1).

When an exposure hazard or health threat to deployed personnel is identified, it must be added to the physiological and psychological stress factors that normally affect a person before, during, and after deployment. All information related to such complex hazards will be of interest for medical intelligence purposes (Stricklin et al. 2007).

The size of a peace or crisis-management operation is likely to have both direct and indirect impacts on the local community. One challenge is to minimize the unintended environmental consequences of the operation, such as depletion

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Engberg, Fahlander, et al. 2003); Lebanon (Eriksson et al. 2007); Liberia (Edlund, Liljedahl, Lindblad, et al. 2004); Moldova (Edlund, Follin, et al. 2004); Somalia (Edlund, Engberg, Liljedahl, et al. 2003); Sudan (Waleij, Edlund, Holmberg, et al. 2004); and Darfur (Swedish Armed Forces Medical Intelligence 2008b).

[2] Injuries that are not related to combat are sometimes referred to as DNBIs, an initialism for "diseases and nonbattle injuries."

Table 1. Spectrum of potential environmental health hazards for deployed personnel as human involvement increases

	Natural hazards (naturally occurring)	Human-made hazards (incidental)	Attacks with weapons (deliberate)
Chemical	– Fumes from a volcanic eruption – Smoke from forest fires	– Incidental chemical release or pollution due to failure of chemical storage or production facilities – Military or terrorist action that causes incidental release due to collateral damage to chemical storage or production facilities – Improper waste and hazmat management	Chemical weapons attack
Biological	– Endemic disease – Exposure to pathogenic microorganisms	– Antibiotic-resistant disease – Incidental release or pollution due to failure of biotech storage or production facilities – Military or terrorist action that causes incidental release due to collateral damage to biotech storage or production facilities – Improper waste and hazmat management	Biological weapons attack
Radiological and nuclear	– Background radiation – Low-level radiation from naturally occurring materials	– Incidental release or pollution due to failure of radiological or nuclear storage or production facilities – Military or terrorist action that causes incidental release due to collateral damage to radiological or nuclear storage or production facilities – Improper waste and hazmat management	Radiological or nuclear weapons attack

Source: Adapted from Senior Defence Group on Proliferation (2005).

of scarce natural resources, soil erosion, pollution, and chemical spills. Peace and crisis-management operations also generally have a major impact on the host economy by increasing the prices of local housing and accommodations and by placing demands on local producers for staple foods and materials, thereby putting such items financially out of reach for the local community (UNDPKO and UNDFS 2008; Hull et al. 2009).

Efforts to do no harm or build back better, sometimes referred to as a light-footprint or zero-footprint approach, are intended to mitigate these problems. They have resulted in environmental policies (UNDPKO and UNDFS

Figure 1. Medical and environmental intelligence and the life cycle of operations
Source: Adapted from Bosetti et al. (2008).

2009), guidebooks (Bosetti et al. 2008), and concepts (NATO 2010) for military operations and decision making that raise the need for environmental intelligence as early as possible in the planning process and during each phase of the mission life cycle (see figure 1).

To enable evaluation of the full range of environmental issues that might affect or be affected by an operation, an EVA framework has been developed by the Swedish Defence Research Agency. This effort was initially funded by the Swedish Ministry for Foreign Affairs for the purpose of supporting the UN Department of Field Support. It was later implemented as a component of the Swedish Armed Forces medical intelligence framework. With support from the Swedish Armed Forces environmental research and development program, the EVA methodology is being further developed, with the aim of creating a transparent, coherent, and reproducible tool that can inform decision making throughout the life cycle of operations.

ENVIRONMENTAL VULNERABILITY ASSESSMENTS

The Swedish Medical Intelligence Network, which consists of the Swedish Armed Forces and the Swedish Defence Research Agency, has conducted some twenty EVAs so far for areas where Sweden is engaged, or might become engaged in

peace or crisis-management operations. Examples include northern Afghanistan, Chad, Darfur, Haiti, and Lebanon. The results have been integrated with Swedish Armed Forces medical intelligence assessments.

The purpose of an EVA is to identify environmental vulnerabilities that should be taken into consideration if a peace or crisis-management operation deploys to a certain region. It is performed in a rapid manner at the outset of the intelligence process and is based on quality-assessed sources of secondary information and on field data when such data are available.

EVAs include an assessment of the causes of differential impacts, together with responses that will prevent, reduce, or offset adverse consequences. The main drivers of vulnerability are identified and then assessed to determine who and what may be exposed to hazards, and when the exposure is likely to occur. The level of sensitivity for each impact is analyzed, together with the capacity to cope with these impacts and other stresses.

The format of an EVA consists of a standard set of questions (see box) combined with an assessment form in a table format (see tables 2 and 3) and supporting maps and geographic information system (GIS) analysis. A color-coded system is used to score the vulnerability estimate for each of the assessment categories. The quality of the underlying data is also scored on a six-point scale.

As a basis for decisions about issues that are context specific and often require in-depth knowledge of critical factors, vulnerability estimates support prioritization and the highlighting of issues that may need immediate and further consideration. Vulnerability assessments should always take into account adaptation options and consider how mitigation could reduce vulnerability. Therefore the assessment should show the present vulnerability level, as well as the level the respective factors would attain after mitigation.

In some cases it is not possible to determine what the mitigation effects will be because of data and information constraints, general uncertainty, or connectivity complexity in time and space. Moreover, sometimes mitigation options are unrealistic or impossible to carry out. For example, in the process of urbanization, the driving forces often cannot be directly affected within the mandate of

Table 2. Assessment form and scoring system for environmental vulnerability assessments

Vulnerability estimate	*Reliability of the source*	*Credibility of the data*
No observable	A Fully reliable	1 Confirmed by another source
LOW	B Normally reliable	2 Probably true
ELEVATED	C Sometimes reliable	3 Possibly true
HIGH	D Normally not reliable	4 Doubtful
VERY HIGH	E Not at all reliable	5 Improbable
NA – Not assessed	F Cannot be assessed	6 Truth cannot be judged

Questions to consider during an environmental vulnerability assessment

I. Environment and conflict relations:
- Is the conflict or crisis linked to environmental factors such as natural resources or environmental degradation? If so, how and to what extent?
- Are the key resources abundant or scarce?
- Is organized crime connected to any natural resources?

II. Institutional capacity and legal framework:
- How are natural resources linked to the war economy?
- Is corruption affecting key environmental issues and natural resource management?
- What environmental legislation, multinational environmental agreements, customary laws, or sending-nation environmental regulations are applicable?
- Does the receiving nation have environmental infrastructure such as water or waste management facilities? If so, are they operational?
- Are large-scale land acquisitions (also known as *land grabbing*) occurring? If so, is it being monitored or addressed?
- Are there transnational environmental concerns or conflicts?

III. Natural resources and environmental changes:

Environmental trends:
- What are the current and predicted future states of the environment and natural resources?
- What are the main relevant ongoing processes of change?

Climate and extreme weather:
- What are the main climatic characteristics of the region?
- What is the type, magnitude, and frequency of extreme weather events?
- What are the main climate change trends, and what are the main predicted concerns regarding future climate changes?

Water:
- What are the hydrological characteristics of the region?
- What are the total natural water withdrawal and recharge rates?

Land and soil:
- Does the region suffer from land and soil degradation?
- What are the current land uses?

Oil and minerals:
- Does commercial mining or oil extraction take place?
- Are there reserves of minerals or oil in the region that have not yet been explored?

Energy:
- What energy production and consumption patterns exist?

Forests:
- How much land is covered by forest?
- What types of forest are there and how are the forests used?
- Does the region suffer from deforestation? If so, to what extent?

Biodiversity and wildlife:
- What is the status of the terrestrial and marine environments?
- Are there protected or endangered species in the region?

IV. Cultural and historical resources and heritage:
- What cultural and historical sites of significance exist (for example, UNESCO* World Heritage sites, graveyards, and spiritual or sacred environments)?
- What key cultural practices exist nationally, regionally, and locally?

V. Socioeconomic and livelihood issues:
- What main livelihoods are permanently or temporarily pursued in the region?
- What are the main socioeconomic trends and their critical characteristics?
- What demography, urbanization, and migration patterns exist?
- What sectors and areas are undergoing rapid expansion?
- What is the situation with respect to gender?
- What is the nutritional status of the population?
- How vulnerable is the area to food insecurity?

* UNESCO (United Nations Educational, Scientific and Cultural Organization) administers the World Heritage Convention, which recognizes the world's exceptional demonstrations of natural and cultural diversity. See http://whc.unesco.org.

Table 3. Hypothetical environmental vulnerability assessment

Environmental vulnerability cutoff date June 1, 2011[a]	*Vulnerability without mitigation*	*Expected vulnerability with mitigation*	*Reliability of the source*	*Credibility of the data*	*Comments*
Environment and conflict relations					
Competition for natural resources	HIGH	ELEVATED	C	2	Scarce land, food, and water resources.
Illegal trade in natural resources	ELEVATED	LOW	A	1	CITES[b] violations.
Environmental crime	HIGH	LOW	A	1	Illegal off-coast dumping of toxic waste.
Institutional capacity and legal framework					
Legal framework	HIGH	ELEVATED	A	1	Environmental legislation exists but is outdated.
Monitoring and control	HIGH	ELEVATED	A	1	Lack of enforcement and monitoring capabilities; general environmental awareness low.
Illegal trade in natural resources	VERY HIGH	ELEVATED	A	1	Poor waste management infrastructure.
Natural resources and environmental changes					
Climate and extreme weather	HIGH	LOW	C	2	Total annual rainfall extremely low; climate change affects crop production, food security, water resources, human health, population settlement, and biodiversity.
Water resources	VERY HIGH	ELEVATED	B	2	Absence of usable fresh surface water resources; locally extreme arid conditions; saltwater intrusion near the coast.
Land and soil	HIGH	ELEVATED	B	2	Salinization caused by improper irrigation and drainage practices; soil erosion caused by excessive overgrazing and shrub clearing.
Oils and minerals	VERY HIGH	NA	B	2	Majority of commercial mining is for oil; production disturbed by conflict.

[a]The cutoff date is the last day in which information is transferred into intelligence for the purpose of assessing environmental vulnerabilities.
[b]Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Table 3. *(continued)*

Environmental vulnerability cutoff date June 1, 2011[a]	*Vulnerability without mitigation*	*Expected vulnerability with mitigation*	*Reliability of the source*	*Credibility of the data*	*Comments*
Energy	HIGH	LOW	C	3	High energy consumption relative to other countries in the region due to cheap oil.
Forest resources	VERY HIGH	LOW	B	1	Widespread deforestation due to charcoal use.
Biodiversity and wildlife	ELEVATED	LOW	A	2	Sensitive and vulnerable ecosystems by the coast.
Cultural and historical resources and heritage					
Historical or cultural significance	ELEVATED	LOW	A	2	Rock paintings; five UNESCO World Heritage sites.
Religious significance	ELEVATED	LOW	C	3	Ancient graveyards.
Cultural traditions	ELEVATED	LOW	B	2	Local dress codes.
Socioeconomic and livelihood issues					
Urbanization	ELEVATED	NA	C	3	Desertification has accelerated migration to cities; many foreign workers present until recently.
Migration	VERY HIGH	ELEVATED	B	2	Internally displaced persons; induced development possible.
Gender	HIGH	ELEVATED	B	3	Gender-based violence; transit route for human trafficking to Europe and other regions.
Demography	HIGH	NA	B	2	Children are a large proportion of population.
Food security	VERY HIGH	ELEVATED	B	2	Short-term difficulty for food to reach vulnerable groups of people; medium- and long-term disruption to the markets from which farmers secure seeds and fertilizers, which threatens agricultural production and income generation.

the operation. In other cases, the vulnerability level can be reduced from very high to low—for example, if mitigation efforts such as actions to reduce deforestation are carefully planned and implemented.

IMPLEMENTATION OF EVA

Collected experience with and knowledge about environmental considerations in peace and crisis-management operations is considerable, but attention to environmental considerations in the planning and execution of peace and crisis-management operations is often insufficient (Waleij, Östensson, et al. 2011). In a few cases, however, EVAs have informed decision making prior to and during Swedish operations.

In 2007, the Swedish Navy deployed in support of the UN peacekeeping operation in Lebanon. The EVA that was performed in the planning phase of the operation identified areas along the coastline that had sensitive and vulnerable ecosystems, and the Navy then avoided those areas (Eriksson et al. 2007). In 2008 an engineering company was preparing to deploy to Darfur, Sudan, in support of a UN and African Union joint peacekeeping mission (Swedish Armed Forces Medical Intelligence 2008b). Because the EVA pointed out many critical environmental issues, a special predeployment training on environmental awareness was performed for the troops.

Later the same year, an amphibious company deployed to Chad in support of an European Union–led mission. The EVA had identified water scarcity as a major problem in the region, so the company was equipped with dry toilets rather than standard water-flushing toilet units (Swedish Armed Forces Medical Intelligence 2008c). In 2009, an EVA informed an environmental baseline survey in an overseas Swedish deployment and what environmental sampling to perform (Liljedahl et al. 2007). An environmental expert was also embedded in the mission.

SHARING AND COORDINATION OF ENVIRONMENTAL INFORMATION

Although the EVA model is finding its way toward implementation by the Swedish Armed Forces, there is to date no equivalent tool used by other peacekeeping bodies, such as the UN Department of Peacekeeping Operations, and no framework is yet in place for systematically sharing environmental information between international peace operation participants. Efforts are underway to improve assessment and information sharing within the UN–European Union–NATO peace operation community, and the UN Department of Field Support has initiated information sharing between UN peacekeeping missions, as well as between the missions and the department itself.

In multinational and multifunctional operations, general and mission-specific information regarding the environment is usually shared only on an ad hoc basis. Individual nations and military and civilian bodies may regularly conduct

environmental assessments or monitor similar environmental risks without coordinating activities or sharing data with one another.

To address this gap, since 2004 Sweden and its partners have undertaken efforts to improve environmental and environmental health information exchange in peace and crisis-management operations. An international military-civilian platform was established in Umeå, Sweden, to address environmental and industrial health hazards (EIHH). It initially operated through biannual workshops, with broad participation from about twenty nations, the UN, and NATO. Within the framework of this collaboration, environmental health concerns in various mission areas were discussed, and the lessons were shared. The network included military and civilian personnel working at strategic, operational, and tactical levels, as well as researchers in a broad variety of disciplines related to environmental health.

Furthermore, in order to test the real-time sharing of environmental information, various pilot projects have been initiated to make medical, environmental, and environmental health information more accessible to key personnel in the field. Examples of such information include locations of industrial sites, data about environmental contaminants, and details about protected areas and cultural heritage sites. Ideally such information is geo-referenced to facilitate GIS integration. However, issues involving operations security and the protection of sensitive information present a key challenge.[3]

The successor to the EIHH network is a new results-oriented project: Effects of Environmental Conditions on Soldiers. The project, consisting of four phases from 2009 through 2012, is funded by NATO's Science for Peace and Security Programme. It was initiated by Canada and Sweden in Stockholm in June 2009, and in 2010 the United States joined the project as an additional partner.

The project calls for a broad-based commitment to the principles of environmental protection, force health protection, and global security, to be reflected in the policies and practices of the science, military, and civilian communities. Participants are from the fields of medicine, engineering, environmental protection, behavioral health, and CBRN (chemical, biological, radiological, and nuclear) research. The aims of the project are to develop a practical, comprehensive approach that combines medical, CBRN, engineering, and environmental doctrines and standards to create tactical best-practices guidelines for NATO operations; to increase interoperability among sending nations and between force health protection and environmental protection; and to reduce the gap between policy and doctrine, on the one hand, and tactical-level performance, on the other. The desired outcomes of the project include the publication of a comprehensive compendium of best practices for environmental health risk assessment, risk communication, and horizon scanning.

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[3] Operations security is a process that identifies critical information to determine whether friendly actions can be observed by adversaries' intelligence systems and whether information obtained by adversaries could be useful to them, then executes selected measures to eliminate or reduce adversaries' exploitation of critical friendly information.

It is hoped that lessons from the international EIHH network and the NATO project can inform the development of new policies, doctrines, and operational strategies in the areas of force health protection and environmental protection. Ideally, a similar civilian-military network dedicated entirely to environmental considerations in peace and crisis-management operations will be established to mirror and communicate with its predecessors.

CONCLUSIONS

All peace operations and crisis-management deployments are specific regarding objectives, chain-of-command structure, and financial resources. The UN Integrated Mission Planning Process recognizes that each environment is unique, so every operation and mandate must adapt to a different context—form follows function. NATO and other bodies use a comprehensive approach that aims for a high degree of integration, coordination, and cooperation among the many types of participants involved in each mission.

The need is increasing for understanding the nexus between security, on the one hand, and environmental issues and natural resources, on the other. Robust and transparent tools can aid in the recognition of environmental drivers of conflict and potential environmental risks to human health, and they can improve the ability to predict and mitigate negative environmental impacts from operations. Moreover, an early understanding of the environmental drivers of conflict enhances the opportunity to identify and secure monetary and human resources for environmental actions within a mission.

To meet these growing needs, the gathering of environmental intelligence should be carried out as an iterative process throughout the life cycle of the mission. EVAs should be conducted at the outset of strategic planning and should inform the scope of the mission mandate and the budget. During the mission, the environmental situation should be closely monitored, and practitioners should develop EVAs into dynamic tools with a view toward continuously identifying new health risks to personnel, new environmental impacts from mission operations, and new sources of local conflict over natural resources. After the mission, the environmental risks and mitigation approaches should be documented and incorporated into an overall effort to identify lessons learned. Over time, environmental intelligence will produce basic information concerning countries, regions, and other specific fields to improve readiness for new deployments and to enable systematic comparisons among various regions and conditions.

Since the goals of the mission include doing no harm, building back better, and winning hearts and minds, the need for timely EVAs and appropriate environmental protection measures is paramount. Environmental effects may be both immediate and long-term, and operational risk management must balance the significance of these effects with wider operational imperatives.

To prevent overlap and to maximize information sharing and coordination among participants in peace and crisis-management operations, there is an urgent

need to agree on the standards for environmental information systems and for data sharing. Assessment tools can improve interoperability in its widest sense: within and between nations, between military and civilian participants in a mission, and between scientists and operators such as planners and people working in the field. The EVA has been operational in the early intelligence phase for a number of deployments and has proved an efficient way to strengthen environmental and natural resource management on strategic, operational, and tactical levels in missions in Sudan, Afghanistan, and elsewhere. It has great potential to support the strategic end goal of the missions themselves and to improve opportunities for sustainable development.

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