

Environmental management: Relevance and implications for management of defence installations for sustainability

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The defence sector in India has generally not been explicitly included within the purview of environmental regulation, perhaps out of deference to the military mission. But this is not likely to remain so into the future. This article presents how procedures for addressing environmental concerns, which are based on developments in ecosystems science and environmental management, can be integrated into the military mission in India.

THE Government of India has promulgated a number of acts, rules, and notifications for the protection and preservation of the environment that are addressed at various sectors – agriculture, industry, forestry, energy, mining, tourism, transportation and human settlement¹. The defence sector has not been explicitly included within their purview, perhaps out of deference to the military mission. In recent times however, the environmental dimension is being increasingly introduced more directly into the military role. The International Association of Retired Generals and Admirals specifically resolved in 1993 to include the military role in environmental protection and restoration. There are several examples of microlevel initiatives at reforestation and greening of the military areas, use of renewable sources of energy, recycling of wastes and other pollution control measures. The Indian military forces have also frequently extended logistics support to the civilian sector agencies in several environmental conservation and documentation efforts in difficult terrain. Many of these efforts are based on individual interest and initiative of the commanding officers. The Army Environmental Cell organizes annual Environmental Meetings, with representatives from the Army Commands, Navy, Air Force, Territorial Army, Border Roads and Environmental Ministry of the Government of India, as well as other non-governmental environmental organizations to discuss and present the progress on environmental concerns (http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/v7850e/v7850e12.htm). All of these measures recognize the importance of environmental conservation and the role of the military. These are largely voluntary measures and there is no institutionalization of activities related to environmental conservation and protection of military lands through formal policies and procedures which mandate

compliance with national environmental policies and laws, while furthering the military mission.

The need for such institutionalization will become increasingly relevant and urgent as available lands for military purposes decline with rising population, demand for land from other sectors rises, and as training and testing activities are modernized and intensified in existing defence-controlled areas. Environmental groups and the government will also apply increasing pressure for compliance with environmental quality standards. This has happened in developed countries like USA, where following the enactment of a series of acts related to the environment conservation and protection, the Department of Defense adopted a policy that commits itself to act responsibly in public interest in managing its lands and resources. It directed its decision-makers and commanders to introduce integrated natural resources management plans while ensuring that they support the primary military mission. The defence forces in India too will have to be concerned, sooner than later, about long-term sustainability of military lands for testing, training and residential purposes, and conformity with national environmental policies and regulations which aim at sustainable development of the regions of which their lands are a part.

The objective of this article is to look ahead and understand how environmental concerns can be anticipated and procedures for addressing them integrated into the military mission in India. In doing so, three factors are kept in view. The first is that land use is vital to the sustainability of the defence mission, but land management is not the primary mission of the military forces. The second factor is that the procedures for protecting and improving environmental quality must be science-based. The third factor is that for effective implementation of an environmental policy, there is a need to have in place a standard management framework that will permit planning, monitoring and evaluating the performance of the system on a 'corporate-wide' scale.

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Accordingly, the article is developed in three parts. The first part presents an international defence forces perspective on ecosystems and environmental management as applied to the defence lands. The purpose of this is to understand and learn about the processes of integrating environmental concerns into defence planning, so that similar processes can be initiated in India. The question of implementation of environmental management across the defence installations on a 'corporate-wide' process by employing appropriate environmental management systems is addressed in part two. In the final part, the implications of these developments for integrating environmental concerns into defence planning in India are presented.

The international defence forces perspective on environmental management

Military activities and environmental impacts

Field training in peace time is essential to keep the defence forces in wartime readiness. Most large defence training areas/installations/cantonments typically consist of a small city or township with housing, commercial, maintenance and light industrial components; a road, rail and air transportation infrastructure; and large relatively undeveloped area for training, testing or storage. They come in a wide range of activities, sizes and locations. The impacts on the ecosystem of administrative and light industrial activities in the area may not be significant. But, environmental management may prove critical in the undeveloped land, which is used primarily to support field training requirements for combat and supporting units. In these areas the defence forces have to balance training and readiness requirements with the conservation of natural resources.

Training by armed units generates cumulative impacts on natural resources. Tanks, mechanized infantry, self-propelled artillery and combat engineer units are extremely mobile because they are tracked vehicles. They are heavy, fast and capable of producing significant physical damage to the natural environment and habitat in a short time. Light infantry units also train to dig in and prepare field fortifications, which can alter vegetation, drainage and wildlife patterns. Engineer units practice obstacle construction, demolition, and road building and maintenance. Logistics units set up small towns with trucks, tracked vehicles, light industrial units, etc. Helicopters practice hovering and landing, which can cause soil erosion, create vegetative bare spots from rotor downwash and disturb bird species. Units must also learn to operate in all types of climates and all types of terrain – mountains, desert, jungle, beaches, etc. All these activities develop military skills, but can often lead to natural resources destruction. Also, significant from the military point of view, they leave a signature which can be useful information for the enemy.

The environmental impacts of military training include vegetation destruction, soil compaction and erosion, increased suspended solids in streams and lakes, increased levels of volatile organic compounds and particulates in the air, higher noise levels and occasional loss of wildlife. Maintenance facilities can impact natural environment by discharging hazardous wastes such as oils, acids, heavy metals, paints and solvents during diagnosis, repair and testing. The housing areas will create the same type of environmental impacts as a small city: municipal solid waste, impacts on drinking water quality, construction waste, etc. The extent of damage to the ecosystem will be determined by the robustness or fragility of the natural resources themselves, type and length of training, weather conditions, recovery potential of the area and the land and wildlife protection and maintenance procedures in effect².

Thus military lands are not totally renewable resources. The training capacity of the lands can be undermined if adequate measures are not taken to protect the ecosystems. In many developed countries, the defence forces have formally undertaken the responsibility for maintaining the ecosystems in the military lands. Some of the measures being taken by them are briefly described, taking the example of the US Department of Defense and the US Army. In these organizations, the environmental policies, strategies and action plans have evolved systematically over the past two decades in response to the environmental concerns. The evolutionary process is well documented, and available in public domain. The development and working of these policies can help understand the process of integrating environmental concerns into defence planning in India.

Environmental policy in the US Department of Defense

The US Department of Defense is the third largest federal land owner in USA and manages about 25 million acres of national lands, which include unique natural and cultural resources. Prior to 1960s, defence lands were exempt from most natural resource planning and environmental protection requirements. As relatively undisturbed natural habitat became increasingly scarce, the priority for its protection also rose, leading to the Sikes Act in 1960. This Act authorized and encouraged, but did not require, the armed services to conserve fish and wildlife, and allow recreation wherever it did not interfere with the military mission. Gradually, the environmental protection laws became increasingly stringent in USA. The Endangered Species Act of 1973 required all federal agencies (including the military) to protect habitat as well as threatened and endangered species and established procedures to consult with the Fish and Wildlife Service, if a proposed activity was likely to harm the listed species. This is a powerful act and has stopped or reshaped many army activities. These acts were mostly seen as reactions to failure, rather than preventing it. By late 1980s the need to be more pro-

active in environmental conservation and protection was felt. In 1989, the US Department of Defence issued a policy directive for a more proactive approach on environmental management in defence lands. It directed the mission commanders to keep informed of the conditions of natural resources and develop integrated natural resource management plans (INRMPs). More specifically, it asked the Heads of military services to ensure that effective natural resources management is an identifiable function and is specifically accountable in performance evaluations at each command level³.

All of these culminated, in 1990, in the establishment of the Army Environmental Policy Institute to provide long-range strategic planning for future environmental requirements. In 1991, the 'US Army Environmental Strategy into the 21st Century'⁴ was declared. The strategy provides a framework to ensure that environmental considerations are integral to the army mission and an environmental stewardship ethic governs all army activities. The strategy takes its direction from its vision that the army will be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of its mission. The strategy identifies four major activities to realize the vision: compliance with all environmental laws, restoration of contaminated sites, prevention of pollution, and conservation of natural resources. In 1994, the army formally took over the responsibility for maintaining the natural resources in the training areas from the engineering community. In 1996, the Department of Defense directed that INRMPs should incorporate the principles of ecosystems management. Guidelines for preparing the INRMPs were issued by the army in 1997. The Presidential Order of April 2000 titled 'Greening the government through leadership in environmental management'⁵ directed all federal agencies to develop, document and adopt formal environmental management systems (EMS) to ensure that policies, strategies and procedures established to support federal environment leadership programmes can be effectively monitored and evaluated. The order mandates that an EMS consistent with the Environmental Protection Agency (EPA) requirements must be in place by 2005 in all federal agencies, including the defence agencies. In January 2003, the Department of Defense issued a new directive on EMS implementation criteria⁶ and metrics to guide and measure progress in implementing the environmental plans.

As a consequence of the above measures, the US Army has in place three broad environmental programmes⁷. These relate to analysis of environmental impacts associated with new army proposals, management of natural resources through integrated planning, and management of training areas. The first of these is to comply with the requirements of the National Environmental Policy Act. The second gradually integrated INRMPs into science-based ecosystems management and with EMS adopted by the industry to conform to international standards (ISO 14001)⁸. The training area

management programme has four broad objectives: integrate environmental planning into all operations, protect natural and cultural resources, ensure that operations comply with international standards, and prevent future pollution. Accordingly, the programme has been designed to include four components: land condition trend analysis (LCTA), land rehabilitation and maintenance (LRAM), training requirements integration (TRI), and environmental awareness (EA). LCTA is used to make decisions regarding training intensity and rehabilitation. LRAM mitigates the adverse effects of training and testing through land maintenance and repair. TRI ensures access to training lands by integrating training activities with the ecological conditions. The EA programme develops material for distribution about environmental stewardship. Several army installations have found it convenient to adopt the watershed management approach for implementing the above four components in a unified framework.

In addition to the generally applicable framework for addressing environmental issues described above, the US Army also has in place a number of specific programmes based on media or resources being deployed. These include⁴:

- (i) Acquisition pollution programme to integrate technology requirements across army commodity areas to maximize environmental benefits over the life cycle of weapons systems. The areas addressed by this programme include elimination of ozone-depleting chemicals, hazardous materials and toxic substances.
- (ii) Installation pollution prevention programme to conserve and recover resources and reuse or recycle materials that would normally enter the solid or liquid waste stream by implementing integrated management approaches in all mission areas.
- (iii) Air quality management programme to identify sources of emissions, determine the type and amount of pollutants and control emissions into the atmosphere to conform with the environmental laws.
- (iv) Environmental noise reduction programme to protect present and future installation missions, personnel, family members and civilian employees by reducing environmental noise impacts where feasible.
- (v) Lead hazard management programme to reduce release of lead, lead dust or lead-based dust paint into the environment from deteriorating paint surfaces and ensure proper disposal of wastes contaminated with lead-based paint.
- (vi) Drinking water management programme to preserve rights to and conserve all water resources and protect them from contamination in order to provide drinking water that satisfies the most stringent regulations.
- (vii) Waste-water management programme to control or eliminate all sources of pollutants to surface- or groundwaters using conventional or alternate innovative treatment systems and processes.
- (viii) Hazardous waste-management programme to substitute non-toxic/non-hazardous materials for toxic/

- hazardous materials and ensure compliance with all regulations pertaining to generation, treatment, storage and disposal of hazardous wastes.
- (ix) Solid waste management programme to minimize generation and disposal of solid wastes by actively encouraging source reduction, reuse, recycling and composting programmes.
 - (x) Underground storage tank programme to ensure that hazardous waste is not stored in underground tanks, all underground tanks have double-walled constructions with interstitial space, and remove all abandoned underground storage tanks
 - (xi) Installation restoration programme to clean up previously contaminated lands.
 - (xii) Cultural resources management programme to ensure that the army manages the cultural resources (historic places, native American lands) under its control in compliance with public laws.
 - (xiii) Fish and wildlife and endangered species management programme to ensure that the army meets environmental compliance and stewardship responsibilities by carrying out mission responsibilities in harmony with the Endangered Species Acts.
 - (xiv) Notice of violation control and management programme to address promptly non-compliance notices from federal environmental agencies or the public and take corrective action.
 - (xv) Reporting system to deploy a database management system with report code symbols to identify all army environmental programme requirements and track the progress in implementation.

The gradual evolution of the environmental policies and implementation procedures on a system-wide scale by the US Army, as described above, has elevated it to the status of a national leader in environmental management in USA.

Environmental policy in Australian Defence Forces

The Australian Defence Forces (ADF) too have realized that environmental degradation can deny access to lands, reduce the realism of training and limit operational flexibility. Accordingly, the ADF Environmental Vision has been developed which reads, 'Defence will be a leader in sustainable environmental management to support the Australian Defence Forces' capability to defend Australia and its national interests'. The environmental strategy for the ADF⁹ is also based on the adoption of the ecosystems approach for integrated natural resources management within the framework of the industrial standard EMS, ISO 14001.

EMS and standards

Increasingly stringent environmental regulations, international obligations and agreements, and private sector rec-

ognition that potential economic benefits may result from improved environmental performance, have contributed to the development of systematic new tools for dealing with complex environmental problems. These tools are the EMS. The International Standards Organization (ISO) published the first world-wide standard for EMS, the ISO 14001, in 1996. Both the US Department of Defense and ADF have adopted the industry standard EMS, ISO 14001 as the guiding framework for implementing their environmental policy. The Ministry of Environment and Forests in India is also advocating the adoption of EMS by industry for effective monitoring of compliance and regulation requirements.

The ISO 14001 defines an EMS as the part of an overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining an environmental policy. It is a voluntary EMS standard that provides a framework to move from reactive and fragmented responses to environmental issues common to compliance-based environmental programmes. At the same time the framework provides for a proactive approach that facilitates early identification of impacts, liabilities and opportunities. The ISO 14001 does not specify absolute requirements for environmental performance but demands a commitment to continuous improvements in environmental performance, efficiency of operations and regulatory compliance, through repeatable and consistent control of its operations. Performance levels are established by environmental law or organizational management.

Thus, instead of focusing on specific environmental activities, the ISO 14001 EMS focuses on 'management' activities. The emphasis is on the management structure and how management achieves its stated goals. While the framework of an EMS remains constant over time, each individual EMS should be tailored to reflect those aspects and environmental impacts that have been deemed significant by the organization, based on its corporate culture and strategic goals. An EMS is therefore, not a stagnant system, but provides the mechanisms necessary to continually evolve to meet the ever-changing needs of an organization. The management framework of ISO 14001 EMS is based on a cyclical process of commitment and policy, planning and implementation, evaluation and review, as shown in Figure 1. The essential elements of ISO 14001 are its auditable requirements:

Commitment and policy: An organization should define its environmental policy that ensures its commitment to its EMS and communicates the policy to all employees and public.

Planning: An organization should formulate a management plan to fulfil its environmental policy by identifying its environmental aspects and impacts and legal requirements, and establishing objectives and targets for the significant impacts.

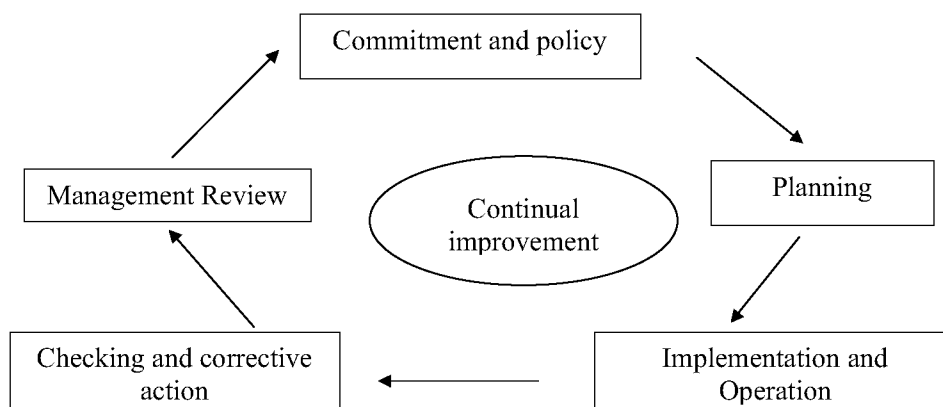


Figure 1. The ISO 14001 EMS process.

Implementation: An organization should develop the capabilities and support mechanisms necessary to achieve the environmental policy, objectives and targets, by defining roles and responsibilities, allocating resources, communicating and documenting the procedures, and providing training to its employees.

Measurement and evaluation: An organization should measure, monitor and evaluate its environmental performance by establishing procedures to control operations and for responding to emergencies.

Review and improvement: An organization should review and continually improve its environmental management systems, with the objective of improving its overall environmental performance.

Formal certification to ISO 14001 can be achieved either by third party audit or self-declaration of conformance with the standard. It is possible to implement ISO 14001 without seeking formal certification.

Towards an environmental policy for defence forces in India

The defence forces in India have installations and carry out operations across many regions in India. Because of rising pressures on land caused by the growing population and from other economic sectors like agriculture, industry, tourism, etc., newer suitable training areas are unlikely to be available in the future. Sustainable environmental management of the existing installations and sites is therefore critical for their continued use and ensuring India's long-term defence preparedness. Accordingly, they will need to adopt an environmental policy and strategy that promotes the military mission while ensuring compliance with the environmental laws and promoting environmental stewardship.

The general layout of the military installations in India, the nature and intensity of training, the townships, industrial and maintenance units within them, and field operations

would be broadly similar to the corresponding features of the US or other modern defence forces. The environmental impacts generated by them will depend on the intensity of the activity and the capacity of the ecosystems, of which they are a part, to absorb the stresses. The stresses are on the soil, water, marine, biodiversity, forest and other ecosystem resources. The ecosystems in India are in many ways more sensitive (than is the case in USA) because of different physiography, climate and other natural resource regimes, and significantly higher population densities. The more sensitive ecosystems in India have been identified in the Western Ghats, ravines, the Sunderbans delta with its wetlands and mangroves, the Northeast, the Shivaliks, flood plains, forests, Eastern Himalayan region, red and black soil, and coastal areas. In all these areas, the defence forces have a strong presence. Some of these locations were chosen because of the natural and locational advantage they provide for military training. In each location, the environmental issues and priorities are likely to be different. From the perspective of the military mission, therefore, it is important to manage these installations in a sustainable fashion. Equally significant is the need to sustain the ecosystems for future generations as some of them are unique and possess biodiversity and other resources of immense value to mankind.

The environmental policy and strategy to be adopted will need to vary with location, type of installation and nature of ecosystem. A management systems framework needs to be established from a corporate or headquarters perspective to guide its implementation and monitor performance at individual installation level. Drawing on the lessons of the environmental policy and its implementation in the US Army, and the developments in EMS in industry, the Indian defence forces also need to integrate environmental policy and programmes into the military mission while ensuring compliance with national environmental laws and promoting environmental stewardship.

It is suggested that the international standard EMS, ISO 14001 be adopted by the defence forces to design and

implement its environmental policy. The documentation and auditable requirements of this EMS (policy statement, environmental management plan, implementation procedures and mechanisms, performance monitoring indicators, review procedures) provide a unified framework within which the environmental management and performance of each installation can be independently articulated, reported and evaluated with respect to its goals. The management plans need to be based on the best science available for the ecosystems and resources in question. This facilitates environmental management on a 'corporate-wide' scale, and also provides for continuous learning, adaptation and improvements in performance at the installation level.

The challenge is for the defence strategists and the military leadership to articulate the relevance and need for an environmental policy for defence to sustain the military mission, and promote its role in environmental stewardship, obtain the resources, and create organizational structures and systems to implement the policy. The ISO 14001 EMS provides the basic framework to meet the challenge.

1. National conservation strategy and policy statement on environment and development. Ministry of Environment and Forests, GOI, 1992.

2. Army ecosystems management policy study. Army Environmental Policy Institute, 1997, p. 152.
3. Environmental conservation programme. Department of Defense Instruction 4715.3, 3 May 1996.
4. US Army Environmental Strategy into the 21st Century. Army Environmental Policy Institute, 1991.
5. Greening the government through leadership in environmental management, Presidential Documents: Executive order 13148, USA, 2000.
6. Environmental management systems pilot study, final report. Department of Defense, ISO 14001, 2000.
7. The Defense Transformation for the 21st Century Act, Bill submitted to the US Congress, Department of Defense, 2003.
8. Sinclair and Tschirhart, R., Army environmental policy and ISO 14001. *Federal Facilities Environ. J.*, 2001, 53–65.
9. Understanding environmental management systems in defence. Australian Defence Forces (<http://defweb.cbr.def.gov.au/ems>)

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