Ecosystems Assessments

Makes Sense

A way to Improve your Mission

CCOE

2012

Society stabilization by winning the environment

Ecosystems assessment makes sense...
Full situational awareness in CIMIC

Preface

NATO Civil-Military Cooperation is a complex process linking military and civil contributions using a comprehensive and cohesive approach to support societies in re-stabilizing, as well as the resolution of complex emergencies to which the Alliance is committed in general. This concerted action demands a fundamental understanding of the reality and circumstances of life regarding the society in focus. To create this understanding, "Advanced Cultural Competence" (ACC) has to be applied.

ACC (see CCOE publication "Advanced Cultural Competence makes sense") is a technique that helps to decipher gained cultural impressions and translate them into data, enabling all contributors to understand the situation at hand, deduct correct conclusions and design efforts which influence the situation in a positive manner. It also helps military personnel understand any impact (positive and negative) to the native culture created by conduction operations in a specific area of responsibility. This is not strictly limited to action, but also extends to non-action. A cultural atmosphere consists of many important influence factors including religion, education, economic situation and the environmental conditions people are living in.

The military at the tactical level has traditionally concerned itself with environmental considerations insofar as making strategic use of terrain and other geo-factors to gain a tactical advantage in order to prevail over an opponent without giving much, if any, consideration to the impact those operations have on the local environment, this often creates inconsistencies between the STANAGS for the higher levels of the Alliance and the tactical level when dealing with environmental protection issues. Environmental protection is one of the important aspects in ecosystem assessments. If the desired end-state is a self-sustaining and functional society when conducting military operations, the environmental situation must be given equal consideration in the decision making process with every other factor that determines the cessation of military operations and facilitates the transition to full self sufficiency.

Ecosystem Assessments are a useful tool to examine the current environmental conditions, and allows the Alliance to plan operations without degradation to the environment. Recognizing the need for consistency throughout all operations and levels, the CCOE developed guidance on how to analyse environmental factors for a complete civil situation picture. The tools outlined

in this brochure will support concerted action by the military, the supporting civil actors, and the indigenous society, focusing on influencing environmental living conditions.

The CCOE has published another volume in its series of tactical guidance titled "…makes sense" in the conduct of CIMIC. This publication will focus on the tactical level of responsibility as well; however, environmental considerations go beyond the scope of just the tactical level. The best approach is a comprehensive one where the tactical level acts upon cohesive guidance from the operational level, harmonized with the governing plan from the strategic level and supported by action from the political level. This broad, across-the-board approach will ensure a coordinated approach with all contributors committed to an area of operations, including International Organisations, Governmental Organisations, Non-governmental Organisations, Inter-governmental Organisations, economic entities and the military.

For a complete overview of the tactical guidance series as well as download-area please visit our website at www.cimic-coe.org.

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Foreword

When we look at military history, we can see that the environment has always been one of the most important factors in military operations. Efficient use of the terrain and battleground was a sine qua non in order to defeat the enemy. For all belligerents, it was of vital importance to deny the opposing force the chance to make beneficial use of the environment at hand. Often in cases of retreat, local resources were destroyed or polluted to prevent the enemy from using them. For instance, in medieval times it was common practice to kill all cattle and poison the water resources in an effort to put opposing forces at a disadvantage. Throughout the course of history, techniques have changed, but the effects have remained the same.

These environmental oriented techniques of war have a huge negative impact on the local population. Although key civil infrastructure, private possessions, and foremost civilians, are protected by a variety of international laws and conventions, these laws have not always been enforced by all sides of the conflict, especially in cases of civil war or situations where one of the actors is making use of hybrid warfare.

The control of natural resources has been a contributing factor to conflict and violence. And if the control of these resources could not be secured by "friendly" troops, their destruction would make sure that the enemy would not benefit from them either.

The Alliance has a different approach towards environmental issues at hand, especially if the mandate includes re-stabilizing a failing society and/or solving existing conflicts.Taking into account the dependency of people on the local environment, and its products and services, commanders not only try to avoid unnecessary damage to the environment, but they also initiate programs and activities to restore the natural resource base, and to reconstruct local livelihoods.

The goal of NATO's stabilization operations is to ensure long term security. Obviously, there can be no security without securing the natural resource base as it provides water, food and shelter. Therefore, to achieve stabilization and sustainable peace, it is paramount that the socio-economic structures are organized in such a manner that all stake holders have access to or benefit from the natural resources.

This publication aims for the tactical level, and since many environmental considerations will not be addressed by the tactical level, they are not mentioned. To facilitate operator handling of this hand-book and the assessment itself, chapter three guides you through the assessment process with the support of a step- graphic as well as checklists on completion of each assessment step in Annex 1.

A typical situation

During a foot-patrol the CIMIC-team is approached by a farmer who asks for support to rehabilitate irrigated land.

Is it an Alliance task to help this farmer? Situations as these are rather complex. The moral obligation of the CIMIC team to help as well as the perception the local people have of the Alliance could demand assistance from the team. However, to come up with any kind of decision, it is necessary to analyze the situation at hand.

In many less developed countries (LDCs), farmers form the majority of the population. Any failures in their performance not only have impact on the local society but have the potential to have far reaching impacts on the living conditions of other social groups and tribes as well.

A likely chain of events might look like this: The farmer needs to cultivate food in order to guarantee a sustainable future and decent living for his family.
Farmers without hope become desperate and would be more likely to support insurgents or even become an insurgent themselves, especially if other alternatives like migration are not possible. The resulting desperation breeds instability, which the insurgency relies upon for legitimacy.

When trying to stabilize a failing society, addressing these potential threats could prove more effective than combat activity alone. Although the focus of the military should remain the military opponent and not the reconstruction of the society, by committing a minimum of resources to aid the civil populace in this manner, the impact to the Alliance posture in the area could be threefold:

1. Combating despair in the local population by offering immediate assistance,
2. providing the tools for long term self-sufficiency,
3. and gaining the support and trust of the population consequently starving the insurgency.

Combating despair goes beyond the short term gain of winning hearts and minds.

If all those factors are present, the CIMIC team might want to recommend supportive actions to the Commander. However, prior to advising action to the Commander, the CIMIC team has to conduct an assessment.

An ecosystem assessment consists of many parts, to which we will introduce you in this brochure. First the CIMIC team has to determine what are the questions at hand in this situation?

This farmer asks for help with his irrigation system.

What does he want exactly, where and why, and who else is there to help him? How much land does he possess?
Where is the water taken from?
What is the main season for irrigation? Where is the drainage water going to?
How many other people use the same water inlet and how much land do they possess?
What does the farmer want to grow with the additional water? Where does he get his inputs?
What will he be going to do with the extra production: will he sell it, or consume it himself?
Is there a market nearby where traders may buy his products? Does he own the land or does he have to pay for its use?
Who distributes the water?
Is he representing only himself or a whole group of farmers; are the farmers organized?
Are there local specialists around that are knowledgeable of repair of irrigation systems, such as agricultural extension workers?
If yes, are these from the government or from NGOs?
Are there contractors that know what to do in these cases?

If time permits (often it does not for security reasons), more general questions may be asked. An example would be to inquire about past trends "What have been the changes since your father was farming here?" Even within a short time frame of 10 to 15 minutes, the CIMIC team could get a reasonable picture of the context of the farmer's problem and what the Alliance might do to help him.

By gathering information during patrols or other third-party-sources, the environmental picture will become more and more complete. This picture is complex with all the interacting components of the environment, the different uses made of it by the inhabitants, together with the diversity of different management regimes applied.

This publication guides you through the understanding of this complexity, how military operations affect the population which depends on services of the environment, and what can be done to enhance positive impacts and mitigate or reduce negative impacts.

Chapter 1: The complex nature of environmental management
Introduction

The purpose of stability operations is to ensure security and stability in which society can prosper without outside assistance.
How does the natural environment, biological diversity or ecological systems factor into achieving that end state?

Negative environmental impacts can decrease quality of life for the local population dramatically, often making stable life in rural and less developed areas nearly impossible. While a degraded environment and internal security do not enjoy a causal relationship, the correlation between the two cannot be ignored.

1.1   Examples of complex ecosystems

We all are part of Nature. While we depend on it to sustain our existence, the natural world is greatly influenced by every action or non-action. Homo sapiens are just one of the many other living organisms that inhabit and rely on the products of nature and the services it provides.

The richness of nature is expressed in its biodiversity. The more diverse nature is, the more interactions there are between its living (biotic) resources like flora and fauna and non-living (abiotic) ones like water, air and soil. This complex relationship between the different components is an ecological system, or ecosystem.

Armed forces deployed to a conflict area depend on nature's resources just as the local population does, but often in these situations, local communities, unlike those forces, cannot easily transport or purchase ecosystem services produced elsewhere (e.g. potable water) if the military operations negatively impact the supply. As a result, the local communities may suffer from shortages of these vital goods.

Forest areas, tropical rainforests and coral reefs are examples of the world's richest and diverse ecosystems.

During conflict, forests may provide shelter and food for military forces.

In a tropical forest, thousands of species live together on a single hectare and a certain level of functional replacement is possible. For, example, vehicle tracks made during movement overgrow rapidly and the forests continue to deliver their products of clean water, wood and food for the local population. However, just because this type of ecosystem has the ability to recover quickly, armed forces still need to operate with care as repeated negative impacts could potentially weaken the ecosystem beyond self-repair.

Tundra areas have a low biodiversity, composed of only a few species causing a very low resilience to disruption. As a result, these species are more vulnerable to the disturbances in the natural environment that often accompany military operations.

These disruptions can have a substantial negative impact on the balance necessary for the ecosystem to flourish including causing irrevocable damage to particular organisms or even the ecosystem as a whole - as the decades-long persistence of tracks made by vehicles in the tundra demonstrate.

1.2 Usage of natural resources and its role in conflicts

Whether for economic, political, socio-cultural, or ecological factors, control of natural resources is often a major contributor to the outbreak of conflict within a society. In other cases where the conflict has some other impetus, resources are still a huge factor because in areas where livelihoods heavily depend on the available local resources, there is the danger of resource depletion, as well as the risk that control of the natural resources becomes a sustaining factor.

Box 1: Example: Natural resources as a cause of conflict in Africa and Asia

In Sudan, displaced people were moving in large numbers from conflict affected areas in the South to the Darfur region. This mass migration to refugee camps put an even heavier burden on the already scarcely available fertile land, vegetation and water in Darfur. Natural resources became overexploited in order to satisfy short-term needs of the fast growing population. This threatened future availability of those resources, which contributed to the tensions in Darfur itself.

Elsewhere in Southern Sudan, the local residents built their own "week-end" cabin inside the nearby refugee camps, so that they not only suffered from the depletion of their land by the refugees, but also could also benefit from the distribution of relief goods by Aid Agencies.

In Somalia, the influx of several hundred thousand refugees from the Ogaden desert in 1979 and the ensuing overexploitation of natural resources are one of the root causes of its permanent destabilization ever since.

In Aceh (Indonesia), a large natural gas facility began operating in 1976, creating much discontent because of corruptive practices and unequal benefit distribution amongst the rural population. A secessionist movement (GAM) emerged and gained widespread support, eventually leading to a violent conflict against the Indonesian government in the 1990s, which lasted until 2005.

Apart from the fact that available natural resources can play a role in causing conflicts, they can also serve to sustain and prolong a conflict. High-value resources such as timber, oil and diamonds are exploited to finance and supply armed forces (see example).

Box 2: Example: Liberian timber trading revenues as financial fuel for rebel group RUF in Sierra Leone

From 1991 to 2002 the rebel group Revolutionary United Front (RUF) fought a war to overthrow the Sierra Leonean government. To finance the training and arming of its people, RUF used profits from the trade of Liberian timber. This was made possible by close ties between RUF and allies among the Liberian leadership.

1.3　Environmental damage and conflicts

Armed operations can lead to intended or unintended disruption of the ecological balance.

1.3.1　Destruction of the environment

Using scorched earth tactics, military forces may consciously destroy the natural resource base in order to force people to leave the conflict zone, to cut supplies to enemy forces, or to simply inflict as much damage prior to retreating from the area.

Military operations can also entail unintended environmental damage. In Iraq for instance the protective desert crust against erosion was heavily damaged by tank tracks and will take approximately 75 years to recover. This also has negative effects for the local people, such as the nomads, who depend on this desert ecosystem for their livelihood .

Other examples of environmental damage include the following:

An example of destruction through negligence: In Kalamaloue National Park in Cameroon the Cameroonian army cut down the last Sahelian gallery forests to provide themself with firewood during the Chad conflict. The resulting deforestation aggravated the already precarious situation of local communities.

An example of deliberate destruction of the resource base: Saddam Hussein's army drained the Chatt-el Arab to drive the opposing Marsh-Arabs out of the Euphrates-Tigris delta.

An example of chemical destruction: After the defeat of Carthage, the Roman generals ordered to sown large amounts of salt into the fields in order to destroy the fertile lands of their former arch enemy. This tactic also has been used in contemporary conflicts. During the Vietnam War, the US Air Force defoliated the jungle with the notorious Agent Orange and during the invasion of Kuwait in 1991 Iraqi troops strategically burnt oil installations which resulted in prolonged air pollution in the region because of the large amounts of soot.

1.3.2 Pollution

Pollution may be an unintended side-effect of warfare, but since Roman times, army commanders have also manipulated nature in order to deprive their opponents from essential natural resources.

1.3.3 Over-utilization

The establishment of refugee camps often puts heavy burdens on the available natural resources. This may possibly induce scarcity and lead to discontent among the resident population and may spread the conflict to other areas. An example of over-utilisation of natural resources: the Virunga National Park in the Democratic Republic of Congo lost more than 150 km^2 of forest in the 1990s, as fast-growing nearby refugee camps were in need of firewood; the combined effects of deforestation and large-scale poaching led to a threat for endangered mountain gorilla populations in the area. These animals form a major tourist attraction, bringing in large amounts of foreign exchange in this poverty struck part of the world.

1.3.4 Fragmentation

Disruption of ecological connectivity will hamper exchange between and within ecosystems. This will affect their functioning and will impact directly those users that are dependent on this connectivity, such as fisheries (since most fish need to reach special areas for spawning). Nomadic herders may revolt against those people and organisations (armies included) that they consider responsible for the obstructions to reach their seasonal grazing lands.

An example of fragmentation: The Ministry of Defence in Israel announced in 2007 its plans to build a fence in the desert of Judea. The fence would prevent desert animals to migrate between the higher cliffs in winter time and the river beds in the valleys in summer times.

In all cases cited, local resource users suffered heavily from the destruction of their environment. It resulted in increased tension and continuously simmering of conflict situations among resource users either in the area itself or in the area where they resettled after having been forced to leave their homeland. Any army that is deployed to establish security in such a situation can only succeed when the ecological dimension is fully taken into account.

Resulting from those effects it has to be stated that there is
<u>No area security without functioning ecological structures</u>!

1.4 Positive impacts of conflicts on the environment

While military operations during conflicts usually lead to destruction of natural resources, there are also good examples of the contrary. Although not the result of a "hot" conflict, a positive example is the Green Belt initiative in Europe. The goal is to transform the former borderline of the iron curtain into an ecological corridor covering the area between the North Sea and the Mediterranean.

The demilitarized zone between North- and South-Korea is another example where conflict helped precipitate the development of a nature sanctuary where species that are endangered elsewhere may now find refuge.

In the Batha Province of Chad, traditional pasture management survived the decades long civil war. Elsewhere, the Sahel suffers from overgrazing triggered by "developments" such as the proliferation of new wells, veterinary care and import of fodder. Those measures maintain livestock numbers above the level that these rangelands can support. In Central Chad, excellent grazing opportunities continue to exist as a result of age-old pastoral management practices that have remained intact despite the decades of civil war which raged through the country.

Often the positive impacts of conflicts on nature can be related to the effects of isolation. By simply keeping people out of an area due to hostilities, their physical absence permits a natural levelling-out of the environment.

Potential environmental benefits can result from armed forces that are actively managing land and water and restoring natural resources. While this scenario is not ideal, it can present a win-win situation for the local communities as well as the military.
Even though this reconstruction work is of essential importance to achieve the objectives of the military mission, it should be handed over to the appropriate governmental agencies and civil society organisations as soon as the general security situation permits.

The establishment of a secure and stable environment in which communities can regain their confidence in a sustainable future by means of efficient

environmental management is one of the main aims for military operations during or after a man-made or natural catastrophe. However, some actors within a conflict benefit from existing anarchy and exercise control over certain valuable resources due to the absence of efficient governmental control. A potential problem might consist of the circumstance that they run an economy of conflict that has aims adverse to those of the military mission.

Because of this, during the early phases of the operation, access for the local communities to land, water, plants and animals may only be established with the assistance of the military mission. Under military shelter, people can start to regain confidence to invest their time and money in growing their own food, protecting their water resources, restoring their forests, managing their fish
stocks and enjoying their landscape for cultural reasons. However, military efforts alone are not likely to solve the fundamental reasons of conflict. Furthermore, transforming resource management into sustainable practices is a long term affair that will not be performed by military forces, but because of the military's unique capabilities, it can help reinitiate resource management programs that
no longer or perhaps never existed.
Efficient ecosystem management is essential to reconstruct key-sectors of society such as agriculture and animal husbandry, water management, forestry and recreation. Without it basic life support cannot be ensured, which results in civil unrest and instability. It brings security and stability to the population and - in the case of peace support operations - contributes substantially to the achievement of military goals.

An example of the positive effects on ecosystems is one of the last of intact pieces of Sahel vegetation ("brousse tigrée"). In 1985 a war started between two of the poorest countries on the planet, Mali and Burkina Faso. The area became a no-man's land, thus providing the necessary undisturbed conditions for a calving ground for the last 450-odd elephants that still roam the Sahel between Mali and Burkina Faso.

1.5 The ecosystem approach: the resource base, its use and its management

Measured in standards of the mission area, current life conditions are one of the factors that determine the length of a military commitment. If those conditions are insufficient to support basic needs of the community, existing conflicts hardly will be solved.

The ecosystem approach may help to maintain living standards on a sustainable level.

Understanding ones environment is a complex issue in and of itself, but when you add human behavior managing it becomes even more so. To achieve sustainability, the full complexity of the environment, its users and its management need to be addressed. The ecosystem approach explained here provides a structure to address natural resources. The role of CIMIC is to provide a complete picture of the civil situation because the ecosystem in which the forces are operating is an important factor that needs to be analysed. The ecosystem approach will ensure this.

The ecosystem approach makes a clear distinction between: 1. the natural system or resource base, 2. the socio-economic system which deals with the use of the resource base and 3. the institutional system that addresses the management of the resource base and its different uses.

Throughout this publication, these three subsystems of the ecosystem approach will be the starting point to describe the different steps in conducting a Rapid Ecological Assessment, resulting in a complete civil picture produced during the conduct of a complete CIMIC assessment.

The first step is the resource base. This consists of all elements that compose the natural and man-made ecosystems (soil, water, vegetation, etc.). Special focus is on how these elements are related to each other, e.g. in the food-web of the WFP.

The second step of the analysis is focused on the people that are part of this specific ecosystem. How do those stakeholders use the different components of an ecosystem? What impact does this have on others? Special attention should be paid to sustainable use in relation to the carrying capacity of the ecosystem.

The third step will focus on the resource use. It is usually exploited by different groups which might compete with each other. How are the resources distributed amongst the groups? A sustainable management system for the resource base is of vital essence. The description of existing management structures and regulations addresses all relevant factors, such as power structure, policy and legislation. A special section is dedicated to militarily relevant international agreements and regulations.

The separate steps, following this sequence, shall address these systems:
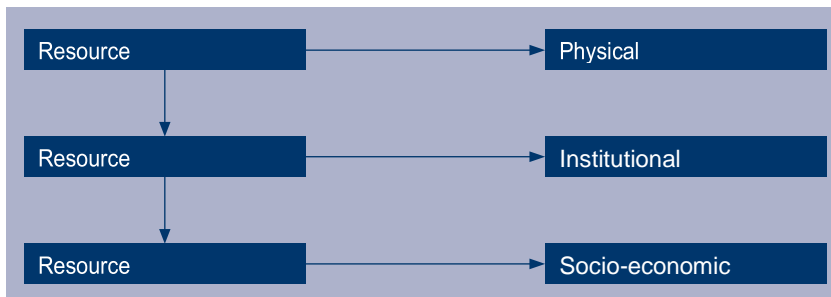
This conduct ensures a complete overview to base an assessment upon.

Gaining control over an area is one thing, but securing it for the future is something different. The desired outcome of a military mission is usually a politically stable environment in which local society can thrive. Actions that unnecessarily endanger the achievement of this goal are to be avoided, while actions that may accelerate the achievement of this process should be promoted.

Environmental considerations have shown to be of paramount importance for a military mission. Not only for the military operation (e.g. ensured access to water), but also to give local communities a perspective for a prosperous future, based on a sound management of their resource base.

The environments in which military personnel are deployed are complex. It entails water systems, farming systems, management systems at different levels, et cetera.

It may, at first sight, seem one incomprehensible mass of complexity. It is important to structure all these impressions and observations to gain understanding how those elements interlink, avoiding pitfalls that may put the military mission in danger. Using these insights helps to identify further steps towards stability. The ecosystem approach has been developed to assist people to understand "their" environment better and to divide it into logical segments. If sustainability is in focus, a deeper understanding of nature's resource base (land, water and vegetation) and its' output capacity is the first concern. The rapid assessment follows this flow-chart; each separate step is described separately in the respective sub-chapter:

Chapter 2: The four steps of a Rapid Ecological Assessment

2.1 Guidance for the assessment

Instruction Card. It is useful to produce checklists for yourself in which you systematically list the information on the environment in which you operate. You will find an example in the annex at the end of this publication as well as at the end of each sub chapter in chapter three. The information gathered should be integrated into these checklists. They have to be updated continuously.

The assessment is an ongoing process. Its structure has to accommodate the inclusion of data from detailed studies which may become available at a later point in time. The Instruction card that is annexed provides a first checklist that might be used.

Assessment tables. In Annex 1, four tables are provided that may help you to organize your data. Their main purpose is to structure your assessment in such a way that you will not miss the most important aspects of the environmental situation. The tables will facilitate this. They are not exhaustive, nor is it necessary to complete them fully for every situation. The assessment tables are a tool to guide you through the assessment process and to ensure that the most important elements of your particular environmental situation are covered.

Sources of information. One of the most important sources of information is the local resource users. They are prime-experts regarding their water, soils, seasons, harvests, etc. Meeting with them, joining them on community walks (if the security situation permits), and exploiting their knowledge is very crucial.
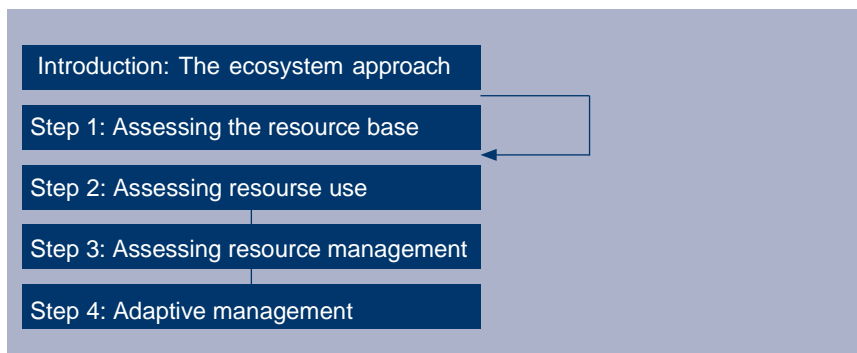
Box 3: Data on Farming systems in Uruzgan.

In Uruzgan, Afghanistan, the Poppy Elimination Program (afterwards renamed "Counter Narcotics Assistance Team"), collects highly relevant statistics about the farming systems in this part of Southern Afghanistan. This rich source of information at farmers' level proved to be essential for the long-term agricultural development plan of the province, developed by the Provincial Reconstruction Team of the Task Force Uruzgan. It was adopted by the local authorities as their plan for agricultural development of the province.

Other useful sources of information are functional specialists within the force, local government agencies, NGOs, project staff and enterprises. They may refer you to "grey-literature" available with their respective organizations which you might not find in scientific publications or on the internet.

Published data might be scarce. Think of atlases, agricultural statistics, human development assessments, country profiles, computerized data bases, et cetera. Often these are aggregated at the national level. Combined with your own field observations they may allow a workable first assessment for the situation in the area. The column with "sources of information" in the assessment tables (annex 1) indicates the most important places where to find information.

The 12 principles of the ecosystem approach. The ecosystem approach has been adopted officially by all governments that have signed the Convention of Biological Diversity, as the appropriate way to conserve nature, to use natural resources sustainably and ensure equitable access to these resources. Twelve guiding principles have been endorsed to achieve all this. These principles are cited in annex 2, each one with a short explanation of its' military relevance. A rapid ecological assessment, following the rationale of the ecosystem approach, is conducted in these four steps, resulting in a complete assessment after having successfully finalized step 4.

Introduction: The ecosystem approach

Step 1: Assessing the resource base

Step 2: Assessing resourse use

Step 3: Assessing resource management

Step 4: Adaptive management

2.2 Step 1: Assessing the resource base (the physical system)

Military personnel are trained to read the landscape for military purposes: which places are exposed, where could be cover for opposing forces, where are the supply lines coming from and going to, what local resources are available, etc.. This ability to assess the landscape in which to operate will also be used to qualify the landscape in more ecological terms: the capacity of the landscape to deliver products and services for human livelihoods and how these are linked to the latest developments. In the next steps, it will be assessed how the military forces themselves are using and affecting those natural resources, and to what extent local communities depend on those resources for survival. Since people depend on natural resources, a logical first step is the assessment of the condition of the natural resources.

Checklist for the physical system
In the present approach, we assess the natural system component by component, following the logic of the food-chain (box 6, see 3.3). Each of the non-living (abiotic) and living (biotic) components are described in qualitative and, as much as possible, in quantitative terms. Trends - if known - are indicated.

The following list is a simple checklist with relevant guiding questions for each category. Table 1 (Annex 1) works it out into more detail.

Abiotic factors:

Weather and climate. Relevant information for plant production i.e. precipitation and temperature during seasons, current weather patterns, etc. Trends may indicate long term changes.
Geology. Mountains, valleys carry characteristic soils and vegetation
Soils and soil fertility. Signs of erosion and soil depletion
Hydrology and geo-hydrology. Availability of surface water (rivers, lakes, marshes, etc.) and groundwater as well as water quality. Is the area drying out? Are there flash floods?

Biotic factors:
Flora and vegetation. Natural and semi-natural vegetation patches may be important to deliver such ecosystem services as soil and water conservation in water sheds, water purification and clean air.
Fauna. Presence of key species at the top level of the food chain (indicators of general ecosystem quality)
Man. Population numbers and density. Age and sex structure. Occurrence of diseases. Life expectancy.
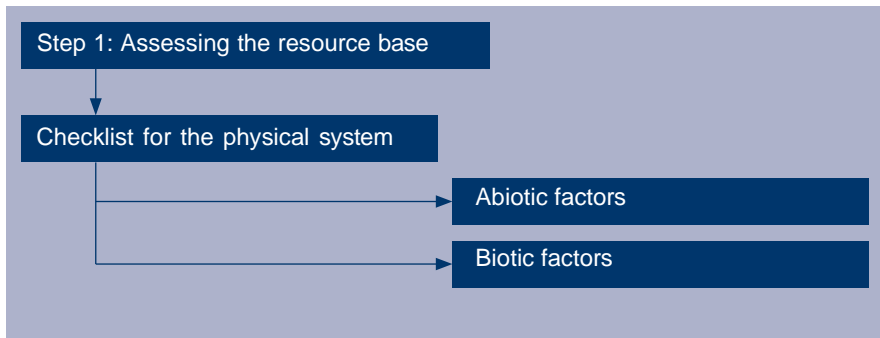
The rationale of Step 1: The factors of the resource base

Box 4: Mankind: subject to the laws of nature.

When different groups of people in a destabilized society depend on the same resource, this might lead to conflict. An example: Overgrazing by livestock leads to disappearance of grass cover, which might lead to starvation of large herds due to the circumstance that two different groups used the same area for support of their livestock. This triggers the migration of the herders and their stocks to other areas, exporting overgrazing and causing conflict with the local residents of the area where they move into. In Mali, the resource conflict between nomadic Touareg livestock keepers and sedentary Sonrhai farmers was one of the driving forces behind what became the Touareg rebellion. The former conflict area is currently the object of a restoration project by UNEP.
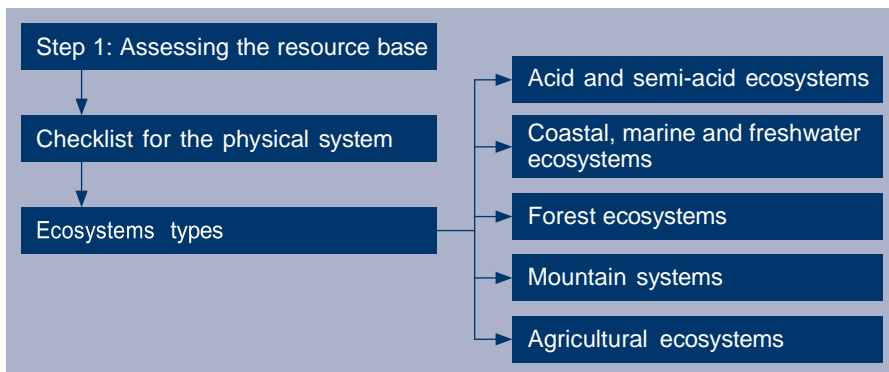
2.3 Additional rationale for Step 1

The food chain
Biotic

As discussed previously, nature is composed of abiotic and biotic resources. Abiotic elements are referring to energy (such as the sun), water, soil, air, and minerals. Biotic resources on the other hand consist of all of the living elements in an ecosystem, everything from bacteria to humans. Within ecosystems, both abiotic and biotic elements depend on each other. Food chains provide good examples of this: a combination of sun, rain and soil allows plants to grow. These plants are eaten by wild animals such as deer, which in turn are predated upon and eaten by carnivores (e.g. wolves, humans).

Quantity and quality of natural resources are never constant, as nature is dynamic. There are many feed-back mechanisms such as the described predator – prey relations where the number of prey animals is controlled by the predators and vice-versa.

Step 1: Assessing the resource base		Acid and semi-acid ecosystems
Checklist for the physical system		Coastal, marine and freshwater ecosystems
Ecosystems types		Forest ecosystems
		Mountain systems
		Agricultural ecosystems

The additional rationale of Step 1: the ecosystems

Ecosystem types

Many different types of ecosystems exist The United Nations Development Programme (UNDP) defines five broad ecosystem types:

1. Arid and semi-arid zone ecosystems,
2. Coastal, marine and freshwater ecosystems,
3. Forest ecosystems,
4. Mountain ecosystems and
5. Agricultural ecosystems.

The latter refers to man-made ecosystems where human activities have become a functional element of the landscape.

Ecosystems as functional ecological units may fit in one (or more) ecosystem types as defined by UNDP. They can additionally be described for different levels of scale such as at the landscape level - like watersheds or coastal plains – up to local biotopes (a system of interacting life forms in a specific area) such as a fresh water lake or a small island.

Ecosystems may differ in their reactions to external changes. Large scale changes may completely alter ecosystems (e.g. climate change, large scale conversion of forests or dam construction in large rivers). In volatile areas this might lead to violent conflicts, especially if water systems in dry land areas are affected (box 5)

Ecological versus military boundaries
There may be important differences between ecological and military relevant boundaries. The watershed may be relevant to both where it separates ecosystems and nations, such as at places in the Alps where the border between Switzerland, Italy and France more or less follows the watershed. A river may be an attractive defence line from a military point of view, it is the very heart of an entire ecosystem (box 6). Managing one aspect of the river in isolation of the other aspect has consequences for the ecosystem on both sides. For instance, building dikes on one side of a river will change the flooding patterns of the other side dramatically, with important consequences for natural resources and human based use of the ecosystem (such as settlements, crop growing and fisheries). Conducting the assessment of the physical system from the military point of view as well as from the resource base is integral to reaching a significant and valid result.

Box 6: The Toucouleur case

The Senegal River forms the international border between Senegal and Mauritania. The wide floodplain of the Senegal River is a major crop producing area in this drought-ridden part of Africa. The proud Toucouleur tribesmen are the traditional users of this ecosystem.

In pre-colonial times, the edges of the floodplain were the borders of the Toucouleur state, and the river with its annual inundations was the heart of it. The economy of their state was based on the functioning of the floodplain and river system. When Senegal and Mauritania gained their independence from France, the Toucouleur state was cut in half along the river creating a defendable border between the two new born states. In 1989 a conflict erupted in Southern Mauritania about the use of the Senegal valley between the Toucouleur and the Maures, the political masters of the country with nomadic roots in the Saharan desert. The Maures wanted to control the Senegal floodplain primarily because of the degradation of their grazing lands in the north. Larger parts of the Mauritanian Toucouleur were driven across the river to Senegal. The Toucouleur tribe lost half of its land. Senegal mobilised its army. A lasting peaceful solution arose when the expelled people were allowed to return to grow crops on their former land in Mauritania again, thus avoiding a major conflict.

2.4   Step 2: Assessing resource use (the socio-economic system)

Step 2 guides you through the process of analyzing the use of the resource base by different stakeholders. This assessment step aligns two key factors: stakeholders and resources. Different groups of users will use different components of the ecosystems in which military operations are conducted. Farmers use land systems, fishermen use water systems.

In other situations different categories of users might use the specific components parallel. Water for instance may be used for navigation, fisheries, drinking water, irrigation, industry and to maintain nature conservation values of wetlands.

Step 2: Assessing resource use

Checklist for the socio-economic system

Extractive users

Non-extractive users
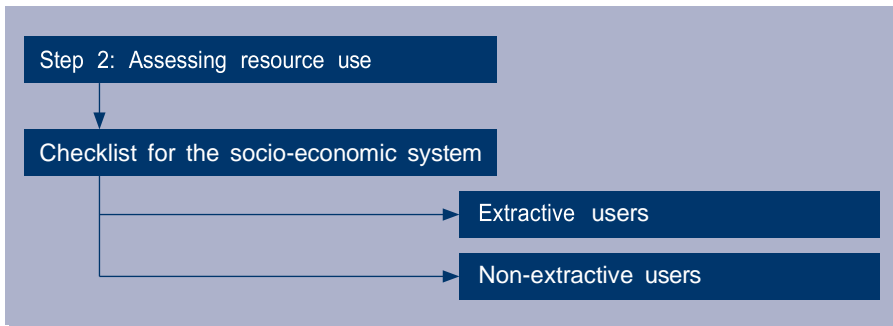
Checklist for the socio-economic system

The following checklist guides you through the assessment process of the socio- economic system. It employs the identification of resource uses as a starting point. These are:

Extractive uses

Land system based:
- Agriculture/horticulture
- Livestock keepers, herders
- Forest users, including hunting
- Mining
- Settlements

Water systems based:
- Fisheries
- Drinking water, industrial water
- Hydropower

Non-extractive uses
- Conservation, Nature Protection
- Tourism and recreation
- Scientific research
- Cultural use (most cultural users worship natural elements (sacred mountains, totems), but some require more consumptive uses to obtain cultural trophies).

The main difference between extractive and non-extractive use is the utilization of resources. Extractive use means that resources are consumed to produce something. Non-extractive can be explained as non consumptive utilization of the environment.

To make sure that you have not forgotten any major use, it is important to double check by going through the results of step 1, and to check for each component of the physical system described whether you have covered the major uses of that component.

When filling in the checklist, you may be confronted with difficulties on where to put a certain observation. For instance, agriculture as a form of land-use may be mentioned under land and soils, but it can also be seen as a form of plant production that you may like to mention under vegetation and flora. The advice is: Don't spend too much time on such issues. The important thing is that it is mentioned somewhere, so that when you plan your interventions (step 4) it is not forgotten. Using table 2 (annex 1) will ensure that all major uses will be identified.

These tools will guide you through the process, but it is impossible to give a comprehensive step-by-step checklist which would be applicable for every possible situation. The user of the checklist or table should therefore not stop just filling in the pre-set categories. The conditions of each situation are likely to be specific to that particular situation and therefore has its own specifics and the user should interpret each situation on a case-by-case basis. However, to be as precise as possible, always try to give numbers (hectares cultivated, people involved, average farm size, numbers of animals, yield per ha etc.) and locations (e.g. terraced small farms in the mountains, larger estates in the valleys).

Tendencies of evolving situations
For a rapid assessment, it is useful to have a first, qualitative appreciation about the impact of actual uses on the condition of the resource base. It is important to note if there are any indications of overexploitation as these may be a reason for conflict, i.e. exploitation beyond the natural capacity for renewal of the resources. Such an indication may be noted by direct observation in the case of recent signs of erosion for instance, but mostly

it might be concluded from information about recent trends: are groundwater tables going down? Are agricultural yields getting lower every year? Do key wild species such as predators disappear? How many more kilometers do women have to walk to get fire-wood? Are fallow-periods shortening (indicating lowering soil fertility as the farmed fields are allowed a shorter period to recover from agricultural exploitation)? These are questions to consider when conducting this portion of the assessment.

All people depend on availability of and access to natural resources that are crucial in sustaining their living, such as drinking water and clean air. Nature provides essential services that care for the recycling of water, the purification of air, the maintenance of soil fertility, pollination of crops, et cetera. During step 2, each component mentioned in step 1 (the ecosystem description) is to be linked with the importance this component has for people, the so called stakeholders. Primary stakeholders are the people (and users' organizations) that depend directly on the products and services of their environment. Primary stakeholders can be matched with the ecosystem components in a matrix of utilization. This is part of a stakeholder analysis, also to be conducted during this step. The necessary tables you will find in the annex.

Other stakeholders are more involved with the management of the resource base, which includes institutions and power brokers, and will be dealt with in next step, step 3.

2.5 Additional rationale for step 2

General public/consumers of ecosystem services. As military personnel also need clean water and air, a substrate to live on, etc., a first assessment to cover these basic needs will usually have been made before deployment. This assessment can serve as the starting point to identify the needs for access to these products and services for all local resource users in addition to what has already been identified for the primary producers.

Cultural awareness. Uses do not always need to be consumptive. Communities may derive part of their cultural identity from the environment they live in. Hurting the cultural identity of people may lead to very strong reactions; therefore, negative impacts on the cultural values of ecosystems should be avoided.
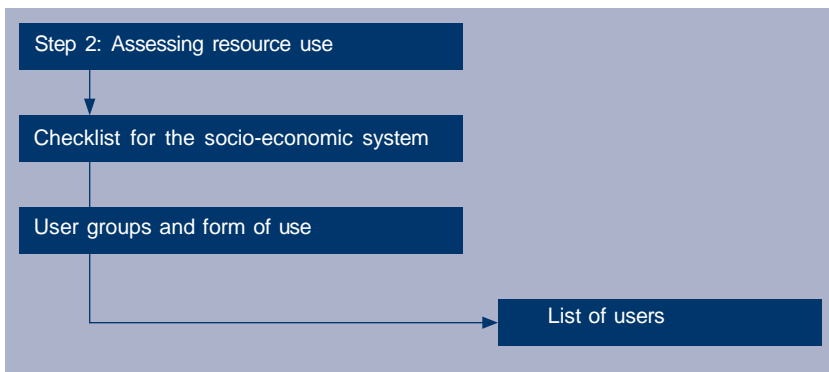
Local producers and exploiters of natural resources. In a rural setting, most people will be farmers, herdsmen or fishermen. In Uruzgan (Afghanistan) for instance, 85 % of the population are farming families. In other situations, local users of the resource base may also include industries like breweries or mines that need water for their production, forest concession holders, local tour operators, or hunting guides.

Enablers. When reconstructing a society, it is important to address the full production chain from the first input for primary production to the processing and commercialization of the products. Enablers are defined in this

publication as organizations (entrepreneurs, agencies) that support primary stakeholders with the production process. One may say that without primary producers, enablers have no reason of being. These stakeholders usually have their ramifications within the power structure for which reason they are dealt with in step 3.

Enablers include extension services, farmers' cooperatives and processing industries. Processing may also take place at the household level in which case we speak of cottage industries.

Unfortunately, some of the resource users are commonly ignored, or even simply forgotten. In order to avoid further tension, it is important to identify these and describe their dependence on natural resources. Such groups include:

Absentee users. People may depend on the products and services that are delivered by ecosystems outside the area where they are living.
Globalization has increased this dependency on a worldwide scale where for instance people in Western Europe now depend on ecosystem products from other parts of the world, such as from tropical rainforests or from large marine ecosystems.

Inappropriate agricultural water management and irrigation technology can cause water to run off from the fields to adjacent rivers, lakes and wetland areas. This run-off water contains pesticide wastes, salts, chemical fertilizers, and other elements that can have a toxic effect on wildlife, freshwater biodiversity and people. On a regional scale, upstream water managers (e.g. dam operators) may not be paying sufficient attention to these downstream ecosystems. Egypt for instance has made explicit military threats to any dams that might be built on the upper Nile without their consent.

Nomadic people may be forgotten (sometimes deliberately so) when planning and implementing development programs. Nomads may be denied access to "their" seasonal grazing lands by local communities of settled farmers that have confiscated these grazing grounds to grow more of their crops. Such confrontations may contribute to a volatile situation and violence, especially where these nomadic people have been the traditional powers, (e.g. the Fulani in the Sahel or the Orma and the Wardei in Northeastern Kenya).

Women. In many cultures it may not be possible to communicate directly with women. Their interests in resource use and in the restoration of ecosystems after conflict tend to be underestimated or overlooked. It may not always be easy to gather information in male dominated societies regarding the womens' interests, but that should not lead to ignorance of the importance of their role in environmental exploitation. In particular the access of women to resources such as land, water and wood should be looked into in order not to marginalize them with wellintended measures. The CCOE publication on Gender gives more information on how to deal with this specific issue.

Mechanization project in Burkina Faso where women were not allowed to use the equipment but were confronted with much more handwork like weeding and harvesting on the larger fields plowed with animal traction

Youth. In many rural societies, the youth is the largest source available for manual work. In some cultures, these very capable, young adults are sometimes considered to be too young to participate in decision making. Ignoring them not only leads to frustration on their side, and a loss of human resources in terms of both physical as well as intellectual capabilities, it also lead to idleness, small crime and even joining opposing forces. Explicit attention to this target group is therefore needed.

Minority groups. Like with women, it may be politically sensitive to address the interests of minority groups explicitly as they often have a low societal status. If the goal is to achieve a sustainable and stable situation for the local society, larger groups of people should not be excluded from the benefits of development; such action would pave the way for discontent and would carry the germ of future conflicts.

Sustainable use

Sustainable use is important to ensure long-term stability. Overexploitation means that more is harvested from a resource than can be renewed by nature. Overexploitation inevitably leads to stress, not only on the environment, but also on human society, which therefore may lead to conflict.
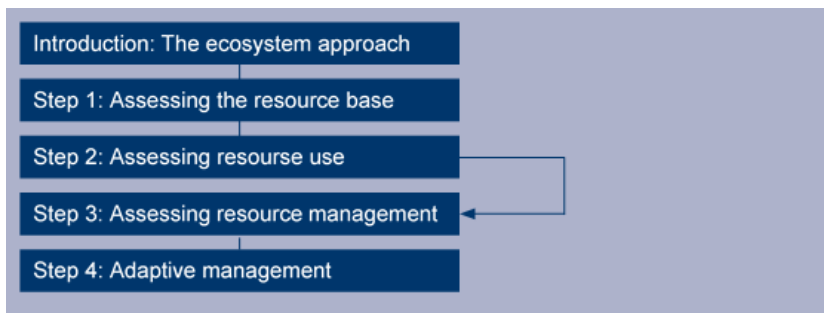
Inappropriate agricultural practices will decrease soil fertility which leads to irreversible losses of agricultural land through disappearance of vegetation and

subsequent erosion. Fishing beyond the reproductive capacity of fish species will inevitably lead to depletion of the fish stock, and - in the worst cases - to extinction of commercial fish species. Overgrazing will cause the disappearance of the grass cover, after which the livestock will die and vegetation stands a chance to return (unless we keep the livestock numbers at an artificially high level through the import of fodder which in most cases is not sustainable). The balance between the natural productivity and the use of the natural resources is known as the carrying capacity of an area. The carrying capacity is a dynamic concept, not an absolute fixed number e.g. a few years of good rainfall can totally alter the carrying capacity of any normally very dry ecosystems When use is at or below the carrying capacity, it is sustainable.

In some situations the carrying capacity of an ecosystem can be increased by inputs. Such an increase can only be sustainable if the input can be provided sustainably. The formula would be "sustainable input >> sustainable output".

2.6 Step 3: Assessing resource management (the institutional system)

Step 3 helps you to assess the management structures and the associated rules and regulations that may prevail in the area of military operations. It draws attention to modern and traditional management, institutions and policies.

Introduction: The ecosystem approach
Step 1: Assessing the resource base
Step 2: Assessing resourse use
Step 3: Assessing resource management
Step 4: Adaptive management

Resource management: successes, failure & conflicts
Resources management addresses the access to resources for the different users. In all forms found today these systems regulate the sharing of resources. The deciding entities are in a very powerful position resulting from the circumstance that they influence the decision process of who gains access and to what extent. This institutional dimension of ecosystem management

deals therefore with POWER. Experience shows that if projects fail to deliver the expected output, it is largely because of problems at the institutional level. The existing powers have not been addressed in an appropriate way. It is the most complicated one of all the steps in land- and water management.

In irrigation schemes, we know exactly how to improve technically the use of land and water. We know that by doing so farming, income is sufficiently raised to make technical innovation economically feasible. And still it may fail. That is because we did not pay sufficient attention to the power structure of the irrigation scheme in which we operate, where powerful farmers at the inlet take more than their fair share of the irrigation water leaving a mere trickle for the powerless at the end of the drain (box 8). Existing uses are embedded in the power structure with regulations to endorse different uses or deny them. As societies and ecosystems change, new claims for access to natural resources will emerge and management will need to be adapted. Such changes may be the root causes for conflict and might remain prevalent in post- conflict situations where existing powers continue to be challenged by opposing forces, causing significant consequences for the users of land and water, flora and fauna as well as for stability and security.

Box 8: Controlling the tap

In Chora, Afghanistan, a particular clan that is related to the former Afghan King still maintains a power base strong enough to resist any challenge to their disproportionate share of the available water coming down from the mountains.

This clan, composed of about 5000 individuals, has built a dam in the local river that may divert up to 50 % of the flow in the dry season to irrigate their tribal land, leaving the other 50 % for the 100.000 people or more downstream.

Military personnel are generally well aware of who the power brokers are, whether it is the government itself, warlords or religious and/or tribal leaders. The other side of this institutional issue, the policies, regulations and legislations, usually is less well known.

Ecosystem Management is mainly influenced by good governance, and the CCOE-publication on this topic should be consulted.

Checklist for the institutional system
The checklist provides a simple matrix to organize information on the management of natural resources, both for the institutions as well as for the regulations.

Table 3 (Annex 1) gives more details to guide you through the assessment of the institutional aspects. It is not of an exhaustive character and needs to be adapted to the area specifics. However, by following it you can be reasonably sure that your assessment covers most major institutions and their regulations.
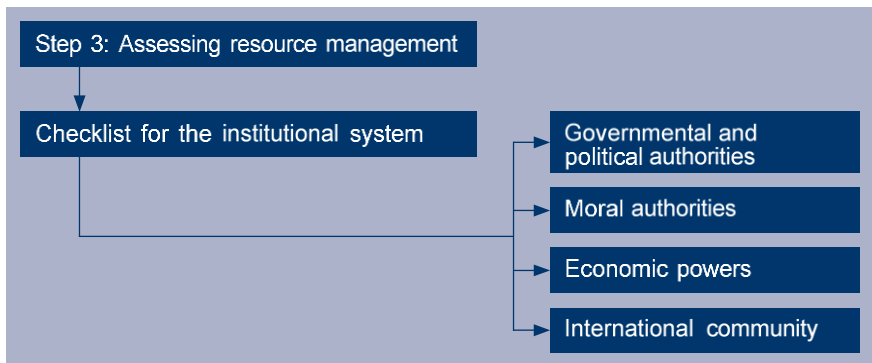
The checklist for the institutional system distinguishes the following categories of institutions with the power to influence and regulate resource conservation and use:

Modern state representations with executive powers:
Institutions, policies, legislation and regulations Political administration
Planning ministries & departments Technical ministries & departments
Traditional authorities with decision taking powers: oral and written traditions
Traditional leaders
Special functionaries in charge with natural resource management

Moral authorities influencing other stakeholders:

Sacred books and regulations Religious authorities Teachers
International Organizations
Non-Governmental Organizations

Economic powers:
Policies
(Large) enterprises Cooperatives

The international Community Policies, treaties, conventions Donors
International Organizations Intergovernmental/multilateral agencies Non-governmental Organizations

2.7 Additional rationale for step 3

Managing conflicting uses
Problems and management conflicts are prone to arise when there is a too large demand for a resource whose availability is limited (box 9).

Box 9: Mozambique - unsustainable management of forests and wildlife in early post-conflict period

During the time of armed conflict in Mozambique (1982-1992), areas rich with natural resources were severely affected. Hunting for meat and trophies by the forces in the area and re-settlements of internally displaced persons contributed strongly to the high-rate of decline in wildlife populations. The massive relocation of people had major impacts on the natural resource base.

In the post conflict period, reconstruction in Mozambique focused on de-mining and rehabilitation of infrastructure with the latter facilitating resettlement of internally displaced persons and improving general access to wildlife areas. Hunting practices by resettled people continued as they needed to supplement their diets with protein. In the absence of a strong authority, hunting practices and especially encroachment in forest reserves became easy and a common phenomenon. Moreover, indigenous knowledge and traditional natural resource management systems had become weak during the years of civil war. A new generation had been brought up far away from their parents' traditional environment, not having gained the traditional knowledge for sustainable natural resource management. In 1994,

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the government of Mozambique recognized this problem and implemented a number of policies that provided better involvement of communities and educated traditional leaders in land and natural resource management.

Water-use in dry areas can be a source of conflict, but also the limited availability of fertile land for an ever growing rural population can lead to violence (box 10).

Box 10: Shortage of land resources

Lack of good land for a large population was one of the major causes for the Tutsi-genocide by the Hutus in Rwanda.
In Uruzgan, irrigable land has become so scarce that the average farm size is no longer able to support a family, certainly not with subsistence farming only. These small farmers take refuge to growing poppy for the opium production as this high-value crop allows them to make the profits in need. They deliver themselves reluctantly to the drugs trade (Taliban and mafia-controlled), to ensure their family remains fed which is understandably their first priority.

Dam reservoirs are often flooding fertile valley-bottom lands for which there is no real substitute nearby. The planned construction of a dam in the Sichuan province in China for instance led to civil unrest amongst the farming villages. Stakeholders do not exist or operate independently from each other. Specific usage and management practices by one stakeholder will affect others (box 11).
Negative effects on the environment of inappropriate resource usage and -management often relate to unsustainable practices resulting in resource degradation (e.g.: overexploitation, resource destruction or pollution).

Box 11: A wetland for waste management and drinking water

The town of Masaka in Uganda is semi-circled by a large Papyrus wetland. Waste water from the city enters the wetland on one side where it is purified so that the city can take good quality drinking water from the other side of the wetland again. There were ideas to reclaim this wetland to develop it for irrigation and grazing, in which case the water purification function would be lost. This calls for management decisions, in this case by the municipality, that forbid the reclamation of the wetland for irrigation purposes.
(This and similar wetlands also played an important role to lay ambush for opposing forces during the Uganda-Tanzania war.)

During and after violent conflicts, authorities might be confronted with chaotic situations that require rebuilding a proper and sustainable community management structure. This can be a vast challenge, as chaotic situations allow corruptive and unsustainable environmental practices develop most likely to the detriment of the peoples' resource base and future (box 12).

Box 12: Afghanistan and its need for institutional restructuring for environmental security

In 2003 UNEP concluded a strong need for Afghanistan to re-establish post-conflict management institutions to rebuild livelihoods, in particular with regard to environmental security. The combination of war, civil disorder, lack of governance and drought caused negative impacts on Afghanistan's' natural resource base due to improper management during these times. This resulted in widespread desertification, erosion and unsustainable water management practices. For Afghanistan's rural population who traditionally provide for
their living through mixed crop and livestock farming systems and nomadic pastoral systems (the Kuchi-people), these impacts on natural resources threatened their traditional lifestyles.

According to UNEP one of the first crucial issues for Afghanistan to tackle was to improve and rehabilitate its current water resource management systems. Traditional local water systems should be restored and improved. This should be done within the framework of a coherent integrated national policy for water.

During the years of conflict, traditional 'kareze' irrigation systems had run dry because of the construction and operation of deep wells that were installed to cater for the short-term need for irrigation water for the displaced population. As a consequence, ground water tables fell, depriving the traditional 'kareze' systems of water supply. Local farmers could no longer irrigate as they used to, which resulted in volatile disputes over access to water.

Categories of ecosystem management institutions in the assessment of resources management (Policies regulations and tasking)
Natural resource management is conducted in different ways, at all levels. On a local scale, resource users themselves need to apply management techniques in order to ensure future access to natural resources.
Logically, we have to divide those differing levels into categories, which need to be analysed separately.

On a larger scale, a whole range of management institutions, private resource owners, community cooperatives, NGOs and international institutions influence the overall resource management system, often according to their own interests. The following overview of possible resource management stakeholders elaborates on the policies and regulations for the major categories of stakeholders from the checklist.

It is important to realise that some of these institutions and their representatives will be at the very heart of the conflict, while others may be considered as partners to settle the conflict and to bring opposing parties together. Modern and traditional authorities for instance may be opposing each other, while moral authorities may be useful to bring people together.

Category 1: Modern administration
In general these are the first management structures soldiers get acquainted with when they operate in a given area. These are the official government structures at national, provincial and local levels.

Politicians and administrators
Decisions on integrated development are taken at this level. Trade-offs are made on the desired use of natural resources within the framework of the official policies. Planning departments usually prepare the decision-making at the integrated level whereby short term economic gains are often favored. It is important to understand how far criteria like sustainability play a role in the planning and decision making processes.

Technical departments and technicians
Experts of technical departments prepare the decision making at the integrated level. The departments that deal with natural resource use and their management usually represent a specific sector, e.g. Industry and Mining, Forestry, Agriculture, Energy, Water or others. Individual sector policies may be of contradictory nature as effective interdepartmental collaboration is not a

common feature in those shaken government circles. The technical planning department should integrate all sector policies into one coherent policy.

All these Government institutions have a number of important roles to play in resource management, and where possible it should be assessed if these roles are fulfilled or not:

Policy making and implementation: The government should provide a framework for guidance for all actors towards sustainable development.

Legislation and regulations: Crucial legislation in resource management deals with land ownership, water rights, access to forest resources, et cetera. Is there   an ownership documentation? Is the legislation on land tenure taking traditional   and communal ownership systems into account?

Advancing knowledge: Education, Research, Information extension for the different sectors. For instance in agriculture: Are there agricultural colleges in the area? Is there an agricultural extension service? Are there pilot farms and demonstration fields?

Inspection and control, monitoring and evaluation: Are there mechanisms in place in case ongoing developments do not lead to the desired results?

Coordination of all actors involved in natural resource conservation and use: Government agencies, civil society, NGOs and private sector (which may include producers groups like fishermen's cooperatives).

Facilitation and stimulation of other actors to invest in development: Are there subsidies available? Do these subsidies cater for sustainability of the use of natural resources?

Communications: How transparent is the government in these matters? Is it accountable?

Category 2: Traditional authorities, non-governmental power brokers
Fundamentals of traditional powers are often based on cultural values. With all the frequency of changes in modern government, these traditional powers provide continuity and hence they often are very influential.
Examples of traditional authorities include the village chiefs like the Malik in Afghanistan, but also the "Chefs de Terre" in West-African societies, where they are in charge of the distribution of land.

Whilst traditional powers may provide continuity, the heads of these powers might not necessarily represent the interests of all the people within the community. A village head may look only after that part of the village community that enables him to stay in power. Within a rural community other clans and tribes may live there, each headed by their own leadership. It is important to know who these people are and to determine what their mandate, power base and influence are. In the more complex cases, these tribal heads may become war lords controlling a larger area with their own tribal militia, and as such they represent a security risk. Even in such cases experience shows that it is possible to unite the antagonistic warlords around the issue of land and water management as they all depend on the natural resources of the area and usually have no interest in destroying these (box 13).

Box 13: Negotiating with traditional powers

In the Democratic Republic of Congo, staff from the Worldwide Fund for Nature (WWF) were able to convince all fighting parties that protection of the forests and the wildlife in it would also be in their interest. As a result, incidences of poaching decreased dramatically.
In Uruzgan (Afghanistan) a "water-shura" reunited all traditional ("Murhabs") and state water managers of the province As a result, decisions have been made for a better balanced water distribution system.

Modern legislation is not always integrating traditional law. Notably in access to land and water resources, modern legislation can violate traditional user rights, thereby creating tension and conflict. Some notion of traditional regulations therefore is needed, especially when intervening in a rural context where traditions may be strong (box 14).

Box 14: Gender issues in resource management

In some West-African societies women cannot own land. Planting a tree in these societies means that you can claim a title on that land. Resulting from that women are not allowed to plant trees as this would make them own that field. Attempts in these communities to stimulate women to plant trees as they are the first beneficiaries of improved availability of fire-wood and other tree products will inevitably fail or will alienate the traditional communities from the government, with mutual irritation and conflict as result.

Category 3: Moral authorities
Every society has a number of persons that derive their influence from the knowledge they have, or the societal values they represent. These include: Religious leaders and priests, like Shamans in pagan communities, Lamas in the Buddhist faith, Imams in Muslim communities or Pastors in Christian societies, may have a lot of influence. Their numbers may not be all that important, but their commitment to the conservation and management of natural resources can be crucial. It is important to have a notion about what the faith itself tells about nature and how to deal with natural resources.

Teachers in general are well respected and can provide direct access to the communities. The terms "guru" and "Marabout" indicate not only class-room teachers as such, but also other persons with respected knowledge that people may turn to for advice.

National and local Non-Governmental Organizations (NGOs) that represent the civil society are often much respected and therefore important. They may be of particular interest as far as access to women and minority groups is concerned. It is good to know if such organizations are present and if they are easy to be accessed.

Category 4: Economic and other powers
Some organizations derive their power from the economic strength they possess. Private enterprise in natural resource exploitation has been dealt with under step 2, but it is good to realize that in these cases their influence usually reaches beyond the exploitation as such, and influences the larger

management of the resource base.

Cooperatives are a special case of private initiative, as they represent collective interests. Their leadership often has a moral authority, representing the members at the governance level.

The international community
In a context of reconstruction, it is important to know what other facilitators may be there to further development, apart from Government and local NGOs. These are especially international donors and donor agencies (including implementing agencies like the German GTZ or the multilateral FAO) that may finance and implement projects dealing with the conservation and exploitation of the resource base.

Governments, armed forces and international donors generally will have to follow the international legal frameworks which have been ratified by their respective governments. Most of these legal frameworks are established in United Nations contexts, often as the outcome of conferences (box 16).
The most relevant international environmental agreements regarding the military are the 1949 Geneva Conventions and the 1976 ENMOD convention (box 15).

Box 15: ENMOD Convention

One major convention operating is the 1976 United Nations Convention on the prohibition of military or any other hostile use of environmental modification techniques, which was preceded and adopted by resolution 31/72 of the United Nations General Assembly. An additional protocol following the Convention is the Geneva protocol I from 1977, which is

considered the most important international legal mechanism on military and the environment:

Protocol I relates to the Protection of Victims of International Armed Conflicts as well as the protection of the environment as such. The Protocol includes two provisions which deal directly with the dangers that modern warfare represents for the environment. Rules that have been formulated from these provisions are Articles 35(3) and 55:

Article 35 : Basic rules
It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long term and severe damage to the natural environment.

Article 55 : Protection of the natural environment
1. *Care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population.*
2. *Attacks against the natural environment by way of reprisals are prohibited.*

Box 16: Conventions and protocols specifically important for the military, other than ENMOD:

- The Hague Convention IV (1907) regulates the means and methods of warfare relevant for the environment; article 22 states that "the right of belligerents to adopt means of injuring the enemy is not unlimited".
- The Hague Convention for the protection of cultural property in the event of armed conflict and its two protocols (1954 & 1999).
- The 1972 convention on the prohibition of the development, production and stockpiling of bacteriological and toxin weapons and on their destruction (BWC).
- The convention on certain conventional weapons or Inhumane weapons convention (CCW). Established in 1980, the preamble of this convention states that "it is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment". Article 2(4) of the CCW Protocol III additionally prohibits "making forests or other kinds of plant cover the subject of an attack by incendiary weapons except when such natural elements are used to cover, conceal, or camouflage combatants or other military objectives, or are themselves military objectives".
- The chemical weapons convention (CWC), which has been ratified in 1997 with the main purpose to ban the use, development and production of chemical weapons.

Specific United Nations member-driven organisations deserve additional attention. The World Trade Organization for instance supervises and deals with the rules of trade between nations at a global or near-global level, and provides a framework for member states to negotiate and formalise trade agreements, and to settle trade disputes. In conflict situations, the WTO has played important roles in banning import and export of natural resource products (such as diamonds or timber), to tackle the issue of export income being used to fuel ongoing violent conflicts.

International conventions with environmental provisions may have

implications that are important for the military (box 17). One of the best known environmental conferences is the 1992 United Nations Conference on Environment and Development ("Rio" Earth Summit), where three major agreements were adopted: Agenda 21, an international plan of action for sustainable development; the convention on biological diversity (CBD) and the United Nations framework convention on climate change (UNFCC). These and other conventions are not specifically aimed at military operations but are of relevance for the military sector as a whole.

As the institutional international atmosphere is subject to constant change and dynamics, it is of importance to regularly update on ongoing issues and debates. A current issue of importance is the human rights discussion, which is developing plans to integrate people's right to a healthy living environment (referring to the right of access to healthy ecosystems and their products and services).

Box 17: Other relevant international conventions

The World Heritage Convention, established in 1972 with the aim to protect the world's cultural and natural heritage sites, which are sites that are depicted as of significant value to humanity. Heritage sites around the world are frequently threatened by violent conflict situations.

The convention on biological diversity (CBD), ratified in 1993. It has 3 main objectives: to conserve biological diversity, to use biological diversity in a sustainable way and to share the benefits of biological diversity fairly and equitably. The CBD has adopted the ecosystem approach as the appropriate way to achieve its goal. As natural resource bases are under high pressure in times of violent conflict (destruction, overexploitation, pollution) the CBD recognizes the importance to comply with CBD standards in regions of conflict.

The convention on international trade of endangered species (CITES) entered into force in 1975. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Typically, illegal trade in CITES-species is facilitated by the anarchic situations during conflict. International forces deployed in peace support operations have occasionally been reported to buy trophies (e.g. Ivory in

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in Central Africa) and life-specimens of animals and plants (e.g. snow-leopards in Afghanistan) on the CITES list.

The Bonn convention or convention on migratory species is an intergovernmental treaty that aims to conserve terrestrial, marine and avian migratory species throughout their range. As migratory species depend on large-scale trans boundary natural resources, they are highly vulnerable to conflict-affected areas whereby their migration routes may be blocked and essential sites for their biological cycles may be destroyed.

Legal frameworks are also brought forward by international organizations other than the United Nations. Relevant to the context of this publication are NATO-policies and regulations. In 2008, NATO's Military Committee Joint Standardization Board (MCJSB) presented its updated Joint NATO Doctrine for Environmental Protection during NATO -led military activities.

Being a NATO Standardization Agreement, this specific doctrine for NATO- led military activities provides guidance in environmental planning for all   military activities. Environmental planning in this context describes how commanders should apply an environmental management system as a tool to avoid or minimize environmental damage, and to incorporate environmental risk management throughout the overall planning and operation of military activities (box 18).

Box 18: Environmental management of Camp Holland (Tarin Kowt, Uruzgan, Afghanistan)

The Task Force Uruzgan constructed a well for their own water supply; this well tapped groundwater from aquifers deeper than those where the local population takes it water from, in order not to negatively impact water supply (systems) of the local communities.

Waste water from Camp Holland is treated so that it meets Dutch standards before being released into the natural environment. Wetland birds can frequently be observed at these places, indicating the acceptable quality of the waste water after treatment.

2.8 Step 4: Adaptive management measures

On completion of the complete assessment conducted in steps 1 to 3 we are now at the stage to develop management measures to influence the situation in a positive way and mitigate possible negative impact of military operations. Step 4 will enable military commanders to design action to compensate, correct or mitigate negative impacts as well as action to positively influence the situation.

Introduction: The ecosystem approach
Step 1: Assessing th e resource base
Step 2: Assessing resourse use
Step 3: Assessing resource management
Step 4: Adaptive management
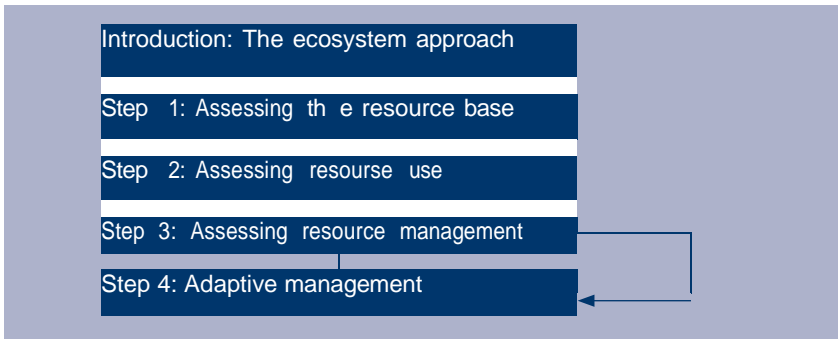
In the checklist for step 4, distinctions are made between:

Positive and negative impacts. Of course the positive ones should prevail, but negative ones may be avoided, mitigated or compensated when you come to think of it. For instance, is it really needed to drive a military vehicle right through a farm field, or may you as well go around it? And if you have to drive through it, are there funds available to compensate the affected farmer?

On-site and off-site impacts. First-hand-users have a tendency to overlook, forget or even deny the interests of off-site or absentee users. However, if you make life more difficult for other users even when they are not living in the place where you operate, you create frustrations and possible new conflicts. For example, if you decide to assist with the construction of a barrier dam that controls water flows, make sure that you involve the downstream users in the operating of this new infrastructure so that their interests will be integrally considered.

Impacts during and after construction. An illustrative example: Transport of

military personnel or of building materials is a temporary activity with locally important ris35

Direct and indirect (induced) impacts. New developments usually attract people, especially in a poor and insecure environment where desperate people will seize every opportunity to make a living. This may bring all kind of effects:

economic activities but also bars, prostitution, diseases, depletion of rare natural resources by the enlarged community, etc. Without sufficient attention, some of these developments (e.g. bars, prostitution) may even directly impact military operations negatively.

Table 4 (annex 1) provides more detailed guidance.

2.9 Additional rationale for step 4

To analyze the potential impacts of proposed activities, it is convenient to go over step 1, 2 and 3 again:
What elements of the ecosystems will be affected by your activity?
Revisit the different components as described under step 1 and imagine if and how they might be affected.
For this, you may want to cut up your planned activity in individual actions: Transport, on-site construction activities, temporary housing, feeding of construction workers, etc.

What users did you identify who depend on these resources (step 2)?
What is the estimate character of these impacts: positive, none, or negative (if negative: negligible, manageable or substantial)? In case you assess that negative impacts could be substantial, you may think of cancelling or altering the proposed activity.

In planning an intervention, it is important to consider whether this intervention may carry a serious risk that could lead to substantial and irreversible negative results. Does your planned action possibly enhance the conflict which is supposed to be settled. In such cases, it is better to redesign the activity in order to keep all future options open. In situations where you cannot be sure about
the potential impacts and if the interests at stake are essential for the survival of the local societies or not, you apply the *precautionary principle*: don't go forward with the implementation of the possible intervention.

This uncertainty demands for another scheme with mitigating measures (fundamentally altering the proposed scheme) in order to prevent negative impacts, or identify compensatory measures for those target groups that will be affected negatively.
Always prefer structural measures above temporary ones such as buying people out. In these cases, most people spend the received money rapidly on consumptive uses.

In case you feel that you have identified a very important negative impact for which you do not feel properly qualified consult your chain of command for guidance.

What are key factors that determine the implementation of sustainable resource use and management during and after conflicts?

Find out what are the most appropriate institutions to negotiate with and to associate to for the implementation of the proposed activities. Consider government agencies with the appropriate mandate for supervision, coordination and monitoring, think of enterprises and NGOs with the appropriate technical, social and economical expertise for the needs at hand. The largest benefit can be achieved by making the users themselves commit to the project itself and their organizations (e.g. farmers cooperatives), together with their traditional management organizations and regulations.

The strengthening of local management institutions is as crucial as is the creation of awareness regarding the integration of natural resource management in society reconstruction. This will create a sense of ownership for the investments made, in particular by means of participatory management practices.

Don't implement measures for which there are appropriate local organisations and experts to conduct the planned activity.

Once you have done step 1, 2 and 3, step 4 logically fills in the gaps. Table 4 (annex 1) elaborates an example.

Chapter 3: The levels of responsibility

The Alliance is following a strict structure to successfully analyze situations, assess needed resources, plan operations and conduct them at the tactical level.

The nature of NATO's missions demand a level of integration and harmonization which cannot be met by measures of the tactical level alone. Resulting from that the ecosystem approach has implications for all levels of responsibility within the Alliance. The interaction responsibilities as well as their requirements are described in depth in the AJP 3.4.9 (Allied Joint Publication for CIMIC).

3.1 The political level

This level will pave the ground for each interaction of the subordinate levels. Here it is decided what the mandate of the forces committed will be and if the reconstruction and development of ecosystems is included and if, up to what extend. It will enable in principle the interaction with all partners committed to re-stabilizing a society.

3.2 The strategic level

As the strategic level develops the more detailed guidance for the operational level, based on the outline of the political level, it will also imply instructions regarding the conduct and policy of ecosystems in the operation area. Added to that the strategic level will design a liaison matrix and link to the highest levels of international organizations, governmental organizations, non-governmental organizations as well as the highest levels of the host nation. The resulting interaction will construct the framework for the cooperation in the mission area. It is of the highest importance that by the means of reporting the strategic level is informed about conduct, success or failure of any measures at the tactical level in order to change agreements at the highest possible level and maybe stipulate a change of attitude in partnering organizations.

3.3 The operational level

Here the detailed campaign plan for any operation is designed. It is of the largest benefit to include the partners in the operations area at each single step. Here synergies can be identified, commonly needed resources will be calculated, plans be de-conflicted and actions be harmonized.
The mandate, as well as the guidance from the two superior levels, will help

develop a course of action that is also including the importance of the ecosystems in the area of operations. The courses of action, together with the centre of gravity, will define at what stage of the operation ecological projects will be conducted as well as depicting the point of time when functional specialists in ecosystems will be deployed to the area.

In order to enable adjustments of plan the information about the situation at hand at the tactical level needs to be transported fast and without friction, thus providing situational ecosystems awareness not only for the tactical but also the operational level.

This level will also allocate needed or not available resources to the forces deployed if deemed beneficial or necessary.

3.4   The tactical level

The responsibilities of the tactical level are described in this publication. It is of the utmost importance that all action according ecosystems is embedded and harmonized with the overall tactical conduct. Alliance forces are surely not
deployed into an area to facilitate the complete reconstruction of all ecosystems in the area. It is merely an important side-aspect of all operations that needs to be recognized as contributor to successful CIMIC.

Annex 1: Assessment tables

Table 1: Assessing the resource base

Component	Quality aspects	Quantitative analysis	Possible observable trends	Information Sources (a/o)
Abiotic components				
Landscape geomorphology/geology	Identification of larger landscape units: Mountains, valleys, plains, rocks, lakes, rivers, etc. Connectivity; geological substrates (faults)	Mapping of these units	Are there large scale man-made changes (e.g. impolderisation); risk of natural catastrophes (e.g. earthquakes)	Own observations; Maps, satellite and aerial photography; Local resource persons (especially for trends)
Climate and weather				
Temperatures	Coldest and hottest seasons/ months	Average temperatures over the seasons	Frequency of extreme events; Climate change indications;	Meteorological data; Extrapolation of national data for the local situation; Local resource persons (especially for trends)
Precipitation	Wet and dry seasons; Wettest and driest months;	Actual precipitation over the seasons		
Wind conditions	Main periods of strong winds	Actual data on wind speed over the seasons		
Humidity	Periods of high and low humidity	Actual data over the seasons	Intensity of human activities that lead to these air-pollutions; changes in complaints about smell	
Air condition	Chemical/ nuclear elements; soot particles concentration; dust	Actual data on smog, soot, dust, ...		
Hydrology Surface water	Periods of high water tables/ peak flows and of low water tables/base flows/no flow; Fresh-, brackish- or salt water; Nutrients/pollution (chemical, bacteriological, sediment load)	Presence of lakes; Seasonal flows of rivers and streams (Peak- and base flows); Water table heights over the seasons;	(Dis-)appearance of permanent water sources; Change in base flows; Frequency of flash floods;	Hydrological data (ground- and surface water table heights); Local resource persons (especially for trends and off-season information);
Ground water	Fresh-, brackish- or salt water; Nutrients/pollution (chemical, bacteriological, sediment load)	Groundwater table depths; Water yield of wells; Presence of different aquifers;	Changes in groundwater tables.	Interpretation of indicators for humidity (e.g. cracked clay, vegetation, trees, ...)
Soils Soil-types/ Texture	Sand, loam, clay, peat and combinations thereof; Position in the landscape (e.g. on slopes, valley-bottoms, ...); Signs of erosion (e.g. gullies, dust storms); Location of good soils for farming;	Results of soil analysis	Increase/decrease in erosion;	Test the "greasiness" of a soil sample by wetting it. The greasier it feels, the more clay and loam it contains; Soil maps; Farmers know where the better soils are located;
Soil chemistry/Fertility	Cropland/fallow land ratio; Salt indicators (e.g. crusts, sometimes in combination with water logging);		Trends in crop yields; Increase in saline soils and/or waterlogged areas; Changes in cropland/fallow land ratio indicating loss of soil fertility;	
Soil origin/ geology	Parent rock material; (e.g. Volcanic rocks and alluvial soils are relatively fertile) Mineral wealth	Presence of oil, diamonds, copper, etc.	Are these resources causing or prolonging conflict	Atlases;

Component	Quality aspects	Quantitative analysis	Possible observable trends	Information Sources (a/o)
Abiotic components				
Flora and vegetation	Presence of remnants of natural flora and vegetation; Presence of special elements like Red Data Book Species, forests; Condition of special biotopes like forests, grasslands, mangroves, sea grass beds, fresh water lakes, etc.	Extent of vegetation units; Location of Red-Data book species;	Decrease/increase of key vegetation types and plant species (e.g. forests, endemic species); Signs of overexploitation (e.g. unpalatable species and bare soil in relation to overgrazing); Presence of invasive species;	Own observations; Local resource users (especially farmers and herdsmen, but also traditional medicine experts); Atlases, maps, satellite photography, etc.; Protected areas information; Flora's, identification keys; Red-Data Book (national/ international)
Fauna	Presence of natural fauna, in particular vertebrates (wild mammals, birds, reptiles, amphibians, fishes); Presence of special elements like Red Data Book Species, raptors, large predators; Presence of pest species;	Extent of home ranges of wild animals, in what environment are they found; Animal numbers; Migration patterns/ seasonality of presence of wild animals; Location of reproduction sites (e.g. nesting, fish- spawning areas);	Disappearance / appearance of key-animals like Red Data Book species, Large predators and raptors; carrion eaters; Endemic species; Changes in key-habitats like reproduction sites;	Own observations of key groups like birds of prey, amphibians, large predators, butterflies, (sightings, tracks, noise, etc .); Local resource users (hunters, fishermen, herdsmen especially); Survey results; Atlases, maps, etc.; Protected Areas information; Field guides; Red Data Book (National and International)
People	Population distribution; Quality indicators of people's life: Diseases, hunger, social disruption, etc.	Demographic data on population: Numbers, sex ratio, age classes;	Indication of deteriorating (or improving) standards of living for the population as a whole and for different groups. Urbanisation, emigration/immigration.	UNDP's human welfare index and background information; Population Statistics; (elderly) citizens

Table 2: Use of the natural resource base

Categories of users and values	Socio-Economic characterization of users	Use of ecosystem components by users	Major sources of information
Agriculture/ farmers; Horticulture/ gardeners; Special attention to: Women Youth Minority groups Absentee stakeholders e.g. downstream water users	Input: Number and categories of farmers/ farming families (e.g. subsistence farmers) Average farm size; Access to credit; Land ownership; Modern inputs: Fertilisers/ mechanisation/pesticides; Knowledge, extension and training; Risk management; Integration with animal husbandry: use of manure, animal traction, fodder Output: Processing facilities/enablers; Storage; Marketing: traders and markets	Major irrigation schemes with indication of reservoirs from where water is taken; Soil- and water conservation measures (e.g. terracing) Crops grown: Cash crops/ subsistence Growing seasons Yields per ha and per region Occurrence of pests and plagues Noticeable impacts on soil, water, air, flora and fauna	Farmers, farming family members; Extension services; Traders; Agricultural statistics; Country profiles (e.g. of UNDP, World Bank); Development NGOs; Maps, atlases, satellite photography;
Livestock keepers Settled ranchers; Nomadic tribes; Special attention to Women Youth Minority groups Absentee stakeholders as nomads are absent from certain areas during part of the year	Input: Number and categories of livestock keepers (e.g. nomads, ranches) Herd size; Access to grazing land; Categories of animals (cattle, sheep, goats, camels, horses, pigs, poultry, etc.); Animal health/ veterinary services; Extension and training; Risk management, e.g. in case of drought; Output: Milk and meat (quantities); Live animals; Processing of livestock products/enablers: Milk based Meat based Wool and leather Marketing of these products Role of livestock as a rural banking facility;	Drinking places for livestock; Quality of drinking water; Seasonal grazing areas and camp sites; Seasonal use of shrubs and trees for fodder; Presence of areas where no livestock can be kept because of lack of water, prevalence of diseases or other. Impacts on nature: e.g. aerosols/ smell/nitrogen deposition, overgrazing around water holes, burning forests to promote grass growth etc.;	Farmers, Extension services; Traders, Agricultural statistics (may be biased because of tax eviction by cattle owners); Country profiles (e.g. of UNDP, World Bank); Development NGOs; Administration of veterinarians (especially also for animal numbers); Maps, atlases, satellite photography;
Forest users Timber and wood Non timber forest resources (NTFPs)	Input: Number and categories of forest users (e.g. hunters) Forest concession agreements; Hunting licenses and other permits for non-timber forest products (NTFPs) Output: Capacity of saw mills; Markets for timber: local, national and international; Importance of NTFPs for local livelihoods; Markets for wildlife products (meat, trophies) and quantities involved; Importance of firewood and charcoal: local use, trade to urban centres; Use of revenues of timber; Processing of medicinal plants, for what use and markets;	Forestry: Forest areas; Village forests; Major species that are exploited for timber or fire-wood; Reforestation practices (nurseries, plantations, ..) Hunting: Number of hunters and poachers; Animal species mostly hunted for meat or trophies; Trade and trends in commercialization of wildlife products; Presence of game ranches; Medicinal plant collecting, wild food plants, building material (e.g. bamboo); Plant species; Trade and trends in commercialization. Impacts: Signs of overutilization (e.g. decreasing plant & animal quantities available on the market); Deforestation rates;	Forest dwellers, hunters etc., Forest concession holders; State Forest services; Agricultural statistics; Country profiles (e.g. of UNDP, World Bank); Conservation and development NGOs; Maps, atlases, satellite photography;

Categories of users and values	Socio-Economic characterization of users	Use of ecosystem components by users	Major sources of information
Conservation related uses Protected areas Tourism Recreation Scientific research	Input: Number and capacities of hotels, campsites, etc. Output: Categories and numbers of tourists: Sightseeing, Hunting tourism National/international tourists	Location and categories of Protected Areas; Location of major tourist attractions and recreational sites; location of (long-term) scientific research/ monitoring plots; Impact on local livelihood access to resources from Protected Areas employment opportunities	Maps, atlases, satellite photography; Tour operators; Forest and wildlife departments; Universities and research stations; Conservation NGOs; Country profiles (e.g. WB, UNDP)
Fisheries Artisanal coastal fisheries Industrial marine fisheries Fresh water fisheries Fish ponds/ shrimps ponds	Input: Number and categories of fishermen; Access to fishing gear; Type of fishing gear; Access to fishing grounds, fish and shrimp ponds; Access to credit; Output: Quantities of fish landed/produced; Processing of fish (smoking, drying, etc.); Marketing: Traders and markets	Place of major fish spawning areas; Major commercial fish species Place of fish cultivation and fish ponds; Impacts: Signs of overfishing (e.g. decreasing quantities available on the market); Impacts of fish/shrimp cultivation on water quality;	Maps, atlases, satellite photography; Fishermen; Fisheries departments; Conservation and development NGOs; Country profiles (e.g. WB, UNDP); Fisheries statistics;
Industrial uses Energy (hydropower in particular); Food and beverages industries Extraction industries/ mining Transport sector: terrestrial, navigation and aerial; Others	Input: Import of production material Essential logistics for the production process Number and categories of users (e.g. employees) Output: Profitability- and feasibility Export and sales Markets	Location (i.e. of major reservoirs for energy production, industrial plants, mines, …); Use of raw material derived from natural resources (water, air, soil, wood, ore, …): Impact of industrial uses and waste management on water, air and soil	Annual reports of the industries; Ministries of industries, energy and mining; Economic statistics; Maps;
Settlements Housing Infra- structure	Input: Demographic figures Output: General characterization (i.e. trading centre, administrative centre)	Location of major settlements, roads and other infrastructure; Use of local natural resources (water, air, soil, wood, fiber, animals, etc.): Impact of uses and waste management on water, air and soil	Local resource persons; General statistics; Maps;
Cultural values	Input: Major religions and number of believers; Cultural heritage characteristics; Output: Religious and cultural events/ festivals What do people identify themselves with (e.g. landscape, heritage sites, art, religious items, etc.)	Location of major cultural and religious assets (e.g. from sacred landscape elements to religious buildings, museums etc.) Use of ecosystem components for cultural purposes: e.g. bathing in sacred rivers, … Impact of cultural uses on quantity of plants & animals	Local resource persons; Historical descriptions; Maps;

Table 3: Framework for analysis of institutions and policies

Institutions	Key-persons	Key-policy documents, regulations and legislation	Source of Information (a/o)
Institutions representing the modern state			
Authorities with the final responsibilities for decision taking on integrated development	N.B. Collect info about the power base of the following persons Local level: e.g. Majors, councilors of municipality Provincial level: e.g. governors, provincial councilors National level: Head of State, Prime Minister, Parliamentarians	It is useful to know what documents exist and where it can be found. There may be many documents, important ones include a/o National, regional, local development strategies Annual development plans	National Documentation Centres, National data bases ; Newspapers, Internet; etc..
Technical departments and government agencies dealing with natural resources and their exploitation, e.g. Agriculture Department Livestock Department Water Board Forestry Department Fisheries Department Energy Department Tourism & Recreation Dept. Mining Dept. Etc., etc.	Refer to the results of step 2 to make sure that no persons with management institutions that address the interests of key-resource users are missed Identify the representatives of each sector at the local/provincial level	Strategic sector plans Annual (work) plans Sector laws: Land laws (cadastre and other) Water laws and regulations Forest laws, Fisheries regulations, Mining codes, Etc., etc.	National Documentation Centres, National data bases; Newspapers, Internet ; Heads of Department ; Legal Advisors, etc..
Traditional authorities and informal powers			
Traditional powers, e.g. representatives of the nobility	N.B. Collect info about the power base of these persons Local level: Village heads, Inter-local level: Clan heads, tribal foremen, leaders of nomadic tribes, war lords	Are traditional authorities, their policies and regulations recognized and by whom? Are there written documents to prove claims on land-, water and other rights? N.B.: some of these traditional authorities may have a religious status.	Documentation Centres, Data bases; Newspapers, Internet ; Heads of Department ; Local resource users ; Etc.
Traditional functionaries charged with natural resource management	e.g. Chef de Terre (Africa), Murhabs (Afghanistan) N.B. : some of these functions may be religiously defined.		Sociologists reports and studies, Documentation Centres; Resource persons from Government agencies, NGOs; Local resource users ;

Institutions	Key-persons	Key-policy documents, regulations and legislation	Source of Information (a/o)
Moral authorities			
Religious leaders	At village and at supra-village level: Imams, Marabouts, Lama's, Reverends, Priests, Shamans, but also Monks, Nuns, hermits, etc. N.B. Collect info about the power base of these persons and the denomination they represent.	Sacred books and their interpretation as documented;	Sociological and cultural studies; Resource persons from NGOs and Government agencies; Historical data; Local people;
Teachers/gurus	Local heads of school ; N.B.: Koranic school teachers (Marabouts) have a religious function, Some Gurus may have followers that treat them as Saints	Written statements by the persons or their followers	Sociological and cultural studies; Resource persons from NGOs and Government agencies; Historical data; Local people;
NGOs	Board members, Directors and Presidents of NGOs ; Field staff at village level	Policy documents characterizing the NGO, with long-term vision, mission and mandate of the organisation	Annual reports; NGO-staff; Resource persons from government agencies; Local inhabitants;
Economic powers (see also step 2 (resource use)			
(Large) enterprises	Directors; Field managers;	Policy documents with a profile of the enterprise, its objectives, vision, ….	Directors; Annual reports; Local representatives of the enterprise; Local people; Resource persons from government agencies and NGOs;
Cooperatives	President and Director of cooperatives	Policy documents with a profile of the cooperative, its objectives, vision, ….	Annual reports; Local representatives of the cooperation; Local members of the cooperative; Resource persons from government agencies and NGOs;
International community			
(International) donors	National Director/coordinator and local representatives ; Project Leaders; Programme Officers; Supervisors e.g. at Embassies;	Country profiles (in case of World Bank, UNDP for instance); Country programmes specifying orientations like sectors and areas of intervention, criteria for projects, etc.; Project Documents;	Annual reports/progress reports; Project staff; Local partners (NGO, Government agencies, local population)
Intergovernmental institutions & international agencies	Directors/coordinators/ representatives of institutions; project leaders; programme officers	Legal documents and country profiles/ programmes of these organizations that deal with sectors relevant to the area of study.	Annual reports/progress reports; Project staff; Resource persons from government agencies; Local partners (NGO, Government agencies, local population)

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Table 4: Planned interventions and its possible interaction with the environment

The following table is giving guidance for a qualitative estimation of the potential impact of planned interventions.

Activity	Characterisation of impact	Positive and negative impacts on			Possible measures
		Resource component (refer to step 1)	Resource users (refer to step 2)	Involved institutions (refer to step 3)	
Reconstruction of an irrigation inlet work. if necessary activities should be cut-down in a chain of individual actions	During construction				
	After construction				
	On-site direct impacts				
	Off-site direct impacts				
	Indirect/induced impacts				

To facilitate the understanding of how to use table 4, it is filled in for a fictive case of small-scale irrigation improvement. The information given does not pretend to be complete, it is only provided as an example how the table might be used.

Activity	Characterisation of impact	Positive and negative impacts on			Possible measures
		Resource component (refer to step 1)	Resource users (refer to step 2)	Involved institutions (refer to step 3)	
Reconstruction of an irrigation inlet work.	During construction	Transport: Air: Dust, exhaust fumes Soils: Use of roads	Public health: respiratory problems because of dust; Risk of accidents.	Contractor; Min. of Public Works; Min. Public Health; Min. Irrigation; Traditional Water managers;	Rerouting of transport; Wetting the road surface; Road safety measures;
		Quarry for sand and gravel	Landscape affected; stagnant water (proliferation of water-born diseases); risk of collapse;	Contractor; Min. of Public Works; Min. Public Health;	Landscaping of quarry after use;
	After construction				
	On-site direct impacts	Water diverted into irrigation channel; Improved agricultural production; Pollution by agro-chemicals; Transport for trading of surplus production;	Improved livelihoods for farming families; Increased risks of water-born diseases; Drainage and water logging problems; Risks of salinisation.	Min. of Public Works; Min. Public Health; Min. Irrigation; Min. Agriculture; Traditional Water managers; Farmers and farmers organisations;	Improve drainage;
	Off-site direct impacts	Reduction of water down stream;	Down stream water users	Ministry of Irrigation;	Water management master plan needed; Consultation of downstream users.
	Indirect/induced impacts		Quarry may be used as waste dumping site	Municipality;	Waste management

Annex 2

The 12 principles of the Ecosystem Approach

In order to give you some ideas about what kind of situations you may be confronted with, the following text may be of help. It is based on the 12 principles of ecosystem management as endorsed by the Convention on Biological Diversity.

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.
Even in non-democratic societies, the authorities in power somehow will have to consider the opinion of their population especially where the basis of their livelihoods will be concerned. It is therefore important to make sure that all relevant strata of the society have been consulted before implementing an activity that affects the resource base. That may not always be easy, and sometimes even impossible, as in the case of trying to consult women in the Pashtun lands of Afghanistan about what would be their preferred intervention. A notorious example is from Afghanistan where deep-wells have been constructed at the request of some powerful landowner without consulting nearby communities that irrigated their lands from Karezes systems. These underground irrigation channels tap the groundwater in the foothills of the mountains, to lead it to their land. By the deep well, so much water is extracted that groundwater levels fall and the karezes run dry. A whole community suffered that way because of the greed of one man. Sadly enough in that situation, there was no local authority strong enough to correct the situation.

Principle 2: Management should be decentralized to the lowest appropriate level.
In this case it is useful to make a distinction between the strategic decision taking and the operational ones. Strategic decisions are usually taken at the higher, often provincial or national level. It deals for instance with the distribution of water or other inputs to the different parts of the country. Within that policy framework, operational users take their day-to-day decisions about where to graze the animals, to water the lands, to collect fire-wood, etc. Military interventions can address both levels. The strategic one is especially of relevance where unequal access to resources may cause friction and conflicts. It may be time-consuming to address this as it often demands a lot

of study, consultations and negotiations. In the mean time actions may have to be taken at the grass- root level in order to give people a decent living again.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
These are the off-site effects that are mentioned in step 4. They may be local, as in the above example of the deep well, affecting *kareze* systems in Afghanistan, but they may also extend over larger areas, affecting relations between different countries. It has been predicted that the 21st century would witness "water-wars" in particular in the Middle-East where the Jordan, Euphrates and Tigris Rivers cross a volatile area where water is a sparse commodity. But that does not exclude other regions, like between India and Bangladesh, or in the Okavango River Basin in Southern Africa where Namibia threatens to tap a large proportion of the River to water the town of Windhoek, thereby depriving the Okavango Delta in Botswana of much of its life-giving annual inundations. So far, governments have behaved responsibly, solving water disputes at the conference table instead of with armed forces.

Principle 4: Recognizing potential gains from management there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem management programme should:
Reduce those market distortions that adversely affect biological diversity; Align incentives to promote biodiversity conservation and sustainable use; Internalise costs and benefits in the given ecosystem to the extent feasible.

Ecosystems provide products and services such as clean air and water, but also wood and bushmeat. These are getting scarcer and therefore are becoming more economically important although it is often not easy to put a money tag on them. In all cases, it is important that people that invest in the proper conservation and management of their resources also get the benefits of their efforts. This means that we must ensure that their interests are explicitly considered and that preferably they participate in decision taking. Too often we have seen that common property goods used by the poor, get an economic value and consequently are taken over by the powerful, leaving the poor even more destitute of anything of value. Wetlands for instance have been considered long time as waste lands, until it was realised that they are very

productive in terms of fish, fodder and –after reclamation - of food. Hunters and fishermen, but also nomadic herdsmen have been marginalised as a result of the reclamation of these common lands. Such a disrespect of their traditional rights usually leads to a free for all mentality, where everything is taken that can be got, and where depletion and extinction becomes the rule. Modern challenges may not always be tackled with traditional medicines, but even within a changing world, respect of traditional management may lead to more sustainable use, improved livelihoods and less conflict.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
This is the nucleus of the conservation of the resource base, on which not only individual persons, but whole communities depend. Healthy ecosystems continue to provide products and services that we need, and in order to keep them healthy, it is important to keep them complete. Indicators of ecosystem health are the provision of the ecosystem services themselves (clean water, buffering flash floods, etc.), but also if the elements of the end of the food chain can still be observed, such as Birds of Prey and Vultures. The disappearance of these birds as a result of inappropriate use of pesticides, was an important indicator that ecosystems in Western Europe were not in good shape and people's health was at risk a/o through the high level of pesticides in food and drinking water.

Principle 6: Ecosystems must be managed within the limits of their functioning.
It is not an overstatement to say that when ecosystems collapse, the society that depends on its products and services will eventually collapse as well. Inappropriate land-use will cause loss of soil fertility and erosion, leading to a rural exodus and erosion of traditional power structures in these areas while at the same time the swelling mass of urban poor contributes to instability and insecurity in the townships and slums where they settle. Inputs may increase the outputs from man-made ecosystems, but that can only be done on a sustainable basis when the additional production permits a sustainable input delivery.
In reconstruction work, one is not likely to be confronted with conversion of an ecosystem like in the case of reclamation of wetlands for irrigation. It is likely to be more a matter of ecosystem restoration (like tree planting) in order to regain important ecosystem services. Nevertheless, it may sometimes

make sense to verify if the area in which the military operate has not been subject to a recent conversion in ecosystems that may not have been properly maintained. In Northern Cameroon for instance, restoration of part of the Logone floodplain after large-scale reclamation for rice growing, has brought back valuable grazing lands, opportunities for fishing and even traditional rice growing, where the modern rice-growing scheme continues to suffer from mismanagement demanding continuous financial inputs to keep it going. In Mauritania, the restoration of the Senegal Delta after the closure of the Manantali and Diama Dams, brought back *Acacia* forests and *Sporobolus* swamps important for local cottage industries, mangroves important for shrimp fisheries, dry season grazing opportunities and an ideal habitat for many migratory birds from Europe. This win-win development helped to lower tensions in this conflict sensitive region.

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

What is the right scale for the management of land, water and living resources? For pragmatic reasons it is simply the scale on which the actual management has the mandate and the power to operate. If you deal with farmers, than you have to decide about the feasible things to do at their level. If obstacles are then identified that involve higher levels of management, a provincial authority or a water board, these obstacles will have to be addressed at the provincial or river basin scale. (This principle is very much related therefore to principle 2).

Winning the hearts and minds demands short term, convincing results which may not always be that easy to achieve. Reconstruction of a resource based local economy often takes much time. Take the example of poppy in Afghanistan: In order to push back the role of poppy in the local economy, one has to find an alternative that gives equally good financial returns with less problems and risks. Although such alternatives exist, these are not introduced overnight. During the years to develop the alternatives, one has to provide other income generating activities, for instance Food for Work programmes to restore farming systems (irrigation, forests) or even off-farm activities like infrastructural development.

Principle 8: Recognising the varying temporal scales and lag effects that characterise ecosystem processes, objectives for ecosystem management should be set for the long term.

Remember: a destroyed bridge may be rebuilt even after 50 or 100 years, but a wetland, a rain forest or the population of the last Mountain Gorillas in the Great Lake Area of Africa once lost, is lost forever.

Reconstruction activities should always keep in mind the long term sustainability. In extreme cases such as when high numbers of refugees have to be lodged and fed, it may be defendable to temporarily overexploit local resources in order
to relieve the suffering and to buy time to find more sustainable solutions. An example how short term interests adversely affected long term use of living resources comes from the response to the Tsunami: In Sri Lanka, in order to get the economy quickly restarted, contractors pushed the rubble of the collapsed houses into the sea. This destroyed a fish reproduction site on which much of the local fisheries depended.

Principle 9: Management must recognise that change is inevitable.
Societies change, and ecosystems do that too. Do not try to bring back the old ecosystem. Restoration will help you to return to a properly functioning system delivering wood, clean water, fertile land, products and services we need. Don't be trapped by the notion that "in the past everything was better". It probably was not, especially not where environmental stress might have been one of the causes of conflict.

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of conservation and use of biological diversity There is no reason to deny that the relation between conservation and development may give rise to conflicts every now and then. The installation of Refugee camps on the edge or even inside some protected areas in Central Africa, are well-known examples. However, as ecosystems provide the base of living for all organisms including human beings, synergy between the interests of conservation and development often is possible requiring some creative thinking and abandonment of dogmatic attitudes branding the other side as "fundamentally wrong". Sustainable use is the answer in many (not all) situations: "What pays, stays" provided proper management structures are in place to avoid overexploitation and extinction and to ensure equitable access for the poor.

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
This principle is very much covered by the first 3 steps of the Rapid Ecological Appraisal described in this document. Insecurity and distrust may make it difficult to gather traditional and local knowledge in the field, but with good interpreters and "hearts and minds activities" attitudes may change quickly. Practitioners are found among government agencies, NGOs and sometimes private enterprise. Scientific information may be old or new, but it helps us to understand the ecosystems and farming systems in which we operate, and to design appropriate measures to improve livelihoods, to reduce impact of military operations and to win the hearts and minds.
Opportunities may exist in which military operations offer options to improve the local situation at the same time, for instance when roads have to be protected against flooding, or when bridges have to be put across a river: Environmental concerns may indicate better places for future development options.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

This publication in itself is proof of this principle whereby the military sector is fully involved with ecosystem management. But it is an appropriate moment at the end of this publication to remind the military involved with reconstruction work during peace support operations, that they should leave as much as possible to the appropriate institutions, organisations and agencies to do the reconstruction and development works in the area where the armed forces operate. When the security situation is such that the military will have to do these activities by themselves because the others are simply not available, then they still have to do this in such a way that the civil partners can take it over from them as soon as the situation permits it. Therefore, all military interventions in the civil realm of reconstruction should always be developed in consultation and association with the partners from the civil society: Government, NGOs, Private sector and local users groups.

Annex 3
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