**Ministry of Foreign Affairs of Denmark**
Danida

Technical Advisory Service

# MONITORING AND INDICATORS IN THE SECTOR OF ENVIRONMENT AND NATURAL-RESOURCE MANAGEMENT

Technical Note

2006

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Monitoring and Indicators in the Sector of Environment and Natural-Resource Management
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# Abbreviations

| | |
|---|---|
| ASPS | agricultural sector programme support |
| BFT | Technical Advisory Service (department of Danida) |
| CBD | Convention on Biological Diversity |
| CBO | community-based organisation |
| CCD | Convention to Combat Desertification |
| CDE | Capacity Development in Environment |
| $CO_2$ | carbon dioxide |
| CPR | common property resources |
| CSD | Commission for Sustainable Development |
| DAC | Development Assistance Committee (of the OECD) |
| Danida | Danish International Development Assistance |
| DFID | Department for International Development (of the United Kingdom) |
| DCCD | Danida's Centre for Competence Development |
| DHS | Demographic and Health Survey |
| EA | Environmental (Impact) Assessment |
| EBRD | European Bank for Reconstruction and Development |
| EEV | Environmental Economic Valuation |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| ESI | Environmental Sustainability Index |
| ESP | environment sector programme |
| FAO | United Nations Food and Agriculture Organization |
| FCCC | Framework Convention on Climate Change |
| FP | Forest Principles |
| GDP | gross domestic product |
| GEF | Global Environment Facility |
| GHG | greenhouse gas |
| GNP | gross national product |
| IEA | International Energy Agency |
| IDA | International Development Association |
| IFCS | Intergovernmental Forum on Chemical Safety |
| IIED | International Institute for Environment and Development |
| ILBM | Intensive Labour-Based Methods |
| ILO | International Labour Organisation |
| IPF | Intergovernmental Panel on Forests |
| IPCC | Intergovernmental Panel on Climate Change |
| IPM | Integrated Pest Management |
| IUCN | The World Conservation Union |
| KP | Kyoto Protocol |
| KVA | Quality Assurance Department (of Danida) |
| MDG | United Nations Millennium Development Goals |
| NCS | National Conservation Strategy |
| NEAP | National Environment Action Plan |
| NGO | non-governmental organisation |
| NSGRP | National Strategy for Growth and Reduction of Poverty |
| NSSD | National Strategies for Sustainable Development |

| | |
|---|---|
| NTFP | Non-Timber Forest Products |
| ODA | Official Development Assistance |
| OECD | Organization for Economic Co-operation and Development |
| OHS | Occupational Health and Safety |
| PNGT-2 | Land Use Management Programme |
| PPP | purchasing power parity |
| PRS | National Poverty Reduction Strategies |
| Sida | Swedish International Development Agency |
| SOER | State of the Environment Report |
| SPS | sector programme support |
| TA | technical assistance |
| ToR | Terms of Reference |
| UNCED | United Nations Conference on Environment and Development |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children's Fund |
| UNSD | United Nations Statistics Division |
| VPA | Annual Business Plan (of Danish representations abroad) |
| WCED | World Commission on Environment and Development |
| WSSD | World Summit on Sustainable Development |
| WHO | World Health Organization |
| WTO | World Trade Organization |
| WWF | World Wide Fund for Nature |

# 1. Introduction

The quality of the environment is inextricably linked to the quality of life for poor people. Changes in environmental conditions can have major impacts on the health, economic opportunities, and security of poor communities. Poor people tend to bear the brunt of the overall burden of disease, particularly in urban areas, and tend to be more dependent on natural resources to sustain their livelihoods in rural areas. The poor are also typically in a state of greater vulnerability and insecurity associated with pollutants and natural disasters, such as flooding and drought. The underlying causes of both poverty and environmental problems are political, legal and financial, they are linked and require coordinated action. Careful attention needs to be paid in the selection of indicators to capture changes in environmental conditions that most affect the poor. Well-selected indicators can also assess the abilities of the poor to adapt to environmental stress (coping capacity).

This Note offers an introduction to indicators and monitoring tools relevant in the sector of Environment and Natural-Resource Management in Danida's countries of cooperation. It is primarily aimed at supporting officers at the Danish representations or at HQ responsible for preparing and managing Danish bilateral development assistance. The Note may also be of assistance to staff in partner organisations responsible for monitoring, their Danida advisers, and consultants who assist in preparing and managing programmes and projects.

This Note forms part of efforts outlined in the *Environmental Strategy 2004-2008* to develop "indicators and methods to monitor achievements that, wherever possible, will be rooted in the co-operation with individual countries" (Danida, 2004a: 11). The Note should be used in conjunction with Aid Management Guidelines (www.amg.um.dk/en), including the Environmental Screening Note (see also www.danida-networks.dk) and national environmental strategies, plans and programmes in each programme country.

Chapter 2 of the present Note provides an overview of 'Ten Simple Steps' for Embassy staff to improve monitoring and indicators in the sector of environment and natural-resource management. Chapter 3 then presents internationally-defined goals, indicators and targets. Chapter 4 deals with the issue of objectives and indicators at the national level, i.e. in poverty reduction strategies (PRSs). Chapters 5, 6 and 7 focuses on the sector as such and on Danish support to it (sector programme support, SPS), discussing relevant indicators and related monitoring tools and methods at this level. Complementary sources of information and useful websites are presented in Appendices A and B, respectively.

The present Note should also be read in conjunction with the technical note on "Monitoring at Programme and Project Level – General Issues" (www.danida-networks.dk), which presents definitions of relevant monitoring terms and explains important aspects of the monitoring challenge at the programe and project level, including the links between monitoring and the international agenda on ownership, alignment, hamonisation, and management for results. The definitions used in the present Note correspond to those presented in the general note.

Comments on this note can be sent to the contact person in Technical Advisory Service: Chief Technical Advisor Henning Nøhr hennoh@um.dk.

## 2. Ten Simple Steps

| *Step* | *Task* | *Potential source(s) of information* |
|---|---|---|
| 1 | Identify what indicator initiatives have already been undertaken. | National PRS and MDG<br>Public expenditure review<br>Danida Country Strategy |
| 2 | Locate existing sources of data and information. Support on-going country-led reporting and monitoring systems e.g. preparing *State of the Environment Reports* and poverty-environment mapping. | NEAP, NCS or NSSD<br>Embassy colleagues<br>Local consultancy |
| 3 | Initiate dialogue with key national stakeholders involved in environmental monitoring. Promote joint actions through donor-coordination groups for environment. | Finance, Environment, Health and other relevant sector line ministries<br>Environment Donor Coordination Group |
| 4 | Specify existing indicator gaps. Define needs at country programme, sector programme and component levels. | Embassy colleagues<br>Review of SPS Programme and component documents<br>Annual performance reports |
| 5 | Establish a priority framework for national environmental indicators with national and local stakeholders. Define clearly *how* the application of policy-oriented indicators will contribute to improving the condition of the environment and natural resources, and to knowing who is poor, and where the poor are located. Agree on clear baselines. | PRS<br>Workshops with national and local facilitators, and with other donors in the environment sector, if possible. |
| 6 | Specify two prioritised output and outcome indicators for each sector programme and each component. Agree on clear baselines. To the extent possible, ensure linkage to MDGs.<br>Indicators need to be SMART (specific, measurable, achievable, relevant and time-bound) | International and local consultants<br>Embassy colleagues<br>Aid Management Guidelines |
| 7 | Harness existing biological, physical, socio-economic and fiscal data collection and reporting systems. | DHS<br>National budget documents<br>University departments, NGOs and CBOs |
| 8 | Assess key data gaps and capacity building that may be needed to improve data sets, data collection and/or data analysis. Identify and, if appropriate, contract partner organisations to be responsible for monitoring and reporting. | International and local organisations/NGOs |
| 9 | Ensure that monitoring processes are provided with adequate resources to be effective, and are accountable. | Danish Embassy (minor projects) |
| 10 | Use and disseminate findings using standard performance reporting, websites, and publications for decision-makers and resource users. | State of the Environment Reports<br>VPA Assessment Report<br>NGO newsletters etc |

## 3. Internationally-defined goals, indicators and targets

In June 1992, Denmark and the global community accepted the *Rio Principles* that emerged from the United Nations Conference on Environment and Development. The World Summit on Sustainable Development, held in Johannesburg in 2002, reaffirmed this global commitment. The United Nations Millennium Development Goals and the Johannesburg Plan of Implementation provide clear targets to be achieved by 2015, including those of relevance to health, to sustain livelihoods through the sustainable and equitable management of natural resources, to reduce the vulnerability of the poor, and to empower resource users. In July 2004, the Danish government adopted a new *Environmental Strategy – Denmark's environmental assistance to developing countries 2004-2008* which recognises that improving environmental management can assist in reducing poverty, since environmental conditions are clearly linked to the livelihood, vulnerability and health of the poor.

A total of 48 quantitative indicators were adopted for the MDG goals and targets. Specifically, 3 targets and 8 indicators were agreed to achieve MDG 7, i.e. 'to ensure environmental sustainability' (Box 1). Task Force 6 on environmental sustainability was established as an integral part of the Millennium Project, and will report to the UN Secretary-General in June 2005. The United Nations Statistics Division coordinates data analysis for the MDG environmental indicators (http://www.developmentgoals.org/Environment; see also World Development Indicators database, World Bank, 2002).

| **Box 1: Targets and indicators to "ensure environmental sustainability" (MDG 7)** | |
|---|---|
| **Target 9:**<br><br>Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources | **Indicators:** [1]<br>**25.** Proportion of land area covered by forest (FAO)<br>**26.** Ratio of area protected to maintain biological diversity to surface area<br>(UNEP-IUCN)<br>**27.** Energy use (kg oil equivalent) per $1 GDP (PPP) (IEA, World Bank)<br>**28.** Carbon dioxide emissions (per capita)<br>(UNFCCC, UNSD) and<br>consumption of ozone-depleting CFCs<br>(UNEP-Ozone Secretariat)<br>**29.** Proportion of population using solid fuels<br>(WHO) |
| **Target 10:**<br><br>Halve by 2015 the proportion of people without sustainable access to safe drinking water and sanitation | **30.** Proportion of population with sustainable access to an improved water source, urban and rural<br>(UNICEF – WHO)<br>**31.** Proportion of population with access to improved sanitation, urban and rural<br>(UNICEF – WHO) |
| **Target 11:**<br><br>By 2020 to have achieved a significant improvement in the lives of at least 100 million slum dwellers | **32.** Proportion of households with access to secure tenure<br>(UN-HABITAT) |

[1] The organizations responsible for monitoring the indicators at global level are mentioned in brackets.

In general, the monitoring framework of the MDGs refrains from assigning a target to each of the indicators. Instead, each target is meant to be monitored through several indicators, for which individual targets are not specified. This makes the significance of each indicator in monitoring the targets somewhat unclear. Some notable weaknesses of the MDG framework concerning environmental monitoring are:

- The risk that environmental concerns will be addressed through a 'stand-alone' MDG 7 rather than being systematically integrated into all goals and targets, e.g. in relation to MDG 1 and MDG 4.

- The lack of specificity of Targets 9 and 11, which precludes effective measurement and monitoring.

# 4. Objectives and indicators in PRS

The World Bank and International Monetary Fund established the requirement that highly-indebted poor countries should prepare Poverty Reduction Strategies (PRSs). This has now been extended to all countries receiving ODA. PRSs typically reproduce four approaches to alleviating poverty: (i) promoting opportunity through "pro-poor growth"; (ii) facilitating empowerment by means of "good governance"; (iii) enhancing security through investment in human capital, notably the health and education sectors; and (iv) special-purpose financing using "social safety nets" for groups marginal to, or adversely affected by, structural adjustment processes.

Development and environmental issues have generally been addressed separately. PRSs provide a framework for integrating several dimensions, such as the environmental determinants of poverty. The key environmental concerns relevant to the poor include environment and health (including malaria and diarrhoea related to water and sanitation, and respiratory problems arising from indoor and urban air pollution); the sustainable and equitable management of natural resources (including access, tenure and property rights to land and natural resources, such as forests and fisheries); reducing the vulnerability of the poor who are disproportionately affected by natural disasters, global environmental change and seasonal fluctuations in the availability of food, water and employment; and empowering resource users (Nunan *et al*, 2002; DFID, 2005).

So far, PRSs have not fully addressed environmental concerns or paid sufficient attention to the linkages between poverty and the environment. Environmental opportunities and problems need to be addressed, if PRSs are to be effective in alleviating poverty and forging sustainable livelihoods and development. Sometimes there is limited involvement of the actors who are most dependent on the environment, limited environmental data available, and discrepancies between donor and recipient-country priorities. Progress has been made towards integrating some immediate environmental concerns, but a focus on long-term sustainability is still lacking (DFID, 2004a: 5-6). However, performance in this regard is improving (see Box 2).

**Box 2: Tanzania's National Strategy for Growth and Reduction of Poverty**
The National Strategy for Growth and Reduction of Poverty (NSGRP) constitutes a second generation PRS, which is committed to the MDGs as internationally agreed targets for reducing, among other scourges, poverty, environmental degradation and discrimination against women by 2015. This strategy also aims to strengthen ownership and inclusion in policy-making processes by institutionalising participation, to pay greater attention to mainstreaming environment, gender and HIV/AIDS, and to address discriminatory laws, customs and practices that retard socio-economic development or negatively affect vulnerable social groups.

## 4.1 Encouraging mainstreaming of environmental indicators in PRS

The initial disregard for the environment in first generation PRSs has now been matched by more countries in second generation PRSs, devising indicators to monitor the links between poverty and environment (DFID, 2000; Danida, 2004). There are some cases of good practice (e.g. in Kenya, Tanzania and Vietnam), but in generally there are: (i) no procedures or indicators for monitoring the environmental impacts of PRS strategies and interventions, and (ii) few indicators for monitoring and documenting the important role of environmental resources in supporting PRS poverty alleviation objectives.

The following activities would support the mainstreaming of environment in poverty reduction strategies. These measures could be taken in the context of environmental sector programmes or as separate environmental support.

- *Facilitate increased attention to environmental issues among policy-makers and staff involved in PRS policy development and monitoring.* This could include: identifying and liaising with the agencies and staff most directly involved in PRS policy-making and monitoring; facilitating workshops on the role of environment in PRSs; and organising meetings between Danida sector review teams and government agencies/staff involved in PRS monitoring.

- *Facilitate dialogue and information-sharing on indicators between environmental professionals and agencies and staff involved in PRS design and monitoring.* This could include: support for joint meetings and activities among PRS monitoring staff and relevant environmental line agencies, civil-society organisations and resource persons in order to help channel existing local know-how on environmental indicators into PRS monitoring.

- *Support practical procedures for integration of environmental indicators in PRSs.* This could include: provision of technical assistance in order to review PRS targets and interventions to help define specific environmental indicators and their integration into the existing PRS monitoring framework (rather than developing isolated programmes for environmental indicators). This process might seek to identify existing PRS indicators that could be used for monitoring environmental impacts (Annex J of the *PRSP Source Book*, World Bank, 2001).

- *Support alignment of national sector plans with environment in PRS.* Based on the above activities, this could include: assistance in creating forums and necessary documentation for aligning environmental aspects of existing sector plans and national environmental strategies with environmental issues of the PRS framework. This would need to be pursued through currently supported sector programmes and in close coordination with other existing monitoring activities in the sectors.

# 5. Objectives and indicators in SPS

The targets, principles, and priorities for Denmark's environmental assistance to developing countries are presented in the *Environmental Strategy 2004-2008* (Danida, 2004a). All environmental assistance must contribute towards fulfilment of the overriding goal of Danish development cooperation, namely poverty alleviation. This means that the environmental assistance must contribute to the realisation of the MDGs which "form the basis for monitoring the entire effort" (Danida, 2004a: 22), and the WSSD Johannesburg Plan of Implementation. The long-term objective of all environmental assistance is "to promote sustainable development in developing countries and to alleviate negative impacts on the environment at global, national and local levels. This is achieved by contributing to the management of environmental challenges in developing countries and by enhancing their ability to ultimately bear the responsibility themselves" (Danida, 2004a: 22).

The Environmental Strategy recognises the need for "improved framework and selection of indicators on environment and improving national capacities to compile and analyse those indicators" (Danida, 2004a: 9). It is also recognised that Danish ODA should increasingly be integrated into recipient structures: "The development of indicators and methods to monitor achievements …wherever possible will be rooted in the co-operation with individual countries" (Danida, 2004a: 11).

The Results Measurement System established for Danish development cooperation was designed to facilitate the review and self-evaluation of country programmes and sector programme support based on a rating system (Box 9), with brief narrative assessments providing the main arguments for each rating. The most important issue raised by the qualitative assessments in 2004 is "the lack of (environmental) indicators in several programmes" (Danida, 2005a: 35).

The development and analysis of information included in Annual Business Plans (VPA), combined with qualitative assessments using a rating system, are intended to indicate how Danida is contributing towards reducing poverty at the country and sector levels. In most countries, the MDG and PRS goals and indicators constitute the overall framework for poverty reduction. Therefore, the selection of one key environmental indicator – among those already included in the hierarchy of PRS and strategic sector plans prepared by relevant line ministries –may serve as a useful starting point for monitoring at the country programme level.

The examples provided in Appendices D-G are intended to illustrate the types of indicators which can be used to monitor environmental concerns in the sectors of agriculture, water, transport and environment at the level of individual sectors as well as components.

In order to facilitate the use of appropriate cross-cutting environmental indicators in Danida-supported programmes, embassy staff, programme staff and others may incorporate one or two indicators on environment into the sector programme. If a sector's contribution to the environment is to be tracked, the sector programme needs to include indicators on the environment. In many cases, sector-programme indicators can be designed so as to integrate environmental considerations into the central objectives of the undertaking (rather than devising isolated sub-indicators on the environment). During programme preparation, the environment should be integrated into at least one or two indicators at the outcome and output level.

## 5.1 Supporting national alignment and adaptation of MDG and indicators

In many countries, MDG and PRS monitoring is not well integrated, and environmental monitoring is not prominent in any of the processes. The MDGs include specific objectives related to environment, and these can be used as an important vehicle for developing and improving environmental monitoring. The following activities would support further national alignment of the MDGs.

*Facilitate efforts to promote greater ownership and integration of MDGs and associated indicators among sector stakeholders.* This could include: stakeholder hearings on translating global MDG 7 indicators into national ones (where relevant, alongside UNDP's efforts to develop National MDG Reports); support for joint development of national indicators drawing on MDG and PRS frameworks. In such a process, attention should also be paid to other MDGs, such as MDG 1 and MDG 4, which are closely related to environmental issues (Box 3).

**Box 3: Integration of PRS, MDGs and caring for the environment**
Bangladesh has one of the most vulnerable economies, characterised by extremely high population density, low resource base and high incidence of natural disasters. The National Strategy for Economic Growth, Poverty Reduction and Social Development attempts to tally internationally-agreed targets with national realities, whilst 'caring for the environment'. It incorporates policies and actions designed to reach out to the poorest and to remote rural areas which are vulnerable to adverse ecological processes, including coastal regions, *chars* and river erosion affected areas.
Source: Ministry of Finance, Government of the People's Republic of Bangladesh, March 2003

## 5.2 Promoting donor coordination of these processes

There are numerous donor-supported initiatives in the field of environment. These follow a host of different interpretations of how to monitor the state of the environment. Therefore, donor coordination of environmental monitoring is crucial. The following activities would support donor coordination in relation to environmental monitoring:

- *Promote the incorporation of environmental monitoring in donor coordination agreements and modalities***.** This could include: liaising with other donors, target agencies and national donor coordination agencies to promote coordinated donor support and possible basket funding of environmental monitoring (Box 4).

- *Facilitate effective dissemination of monitoring results and methods to the wider donor community.* This could include: ensuring that information and methods generated through specific Danida support for environmental monitoring are circulated to all relevant donors (both in the environment sector as such and where environment is relevant as a cross-cutting issue).

**Box 4: Promoting donor coordination and aid harmonisation**
In Tanzania, the Danish Embassy has been actively involved in a donor coordination group on environment for more than a decade. This has facilitated a number of joint initiatives including national inventories of donor-supported environmental projects and programmes, and a public expenditure review of environmental activities.

# 6. The choice of indicators

Environmental indicators serve to measure and hence report on environmental factors. Ecological indicators are often considered a subset of environmental indicators that apply to ecological processes Environmental indicators typically include physical, biological and chemical indicators, and generally comprise indicators of environmental pressures, state and societal responses (OECD, 1993). So if the environment is an object of monitoring, agricultural, social, and economic indicators may also be considered environmental indicators. These can be used as proxies for state of the environment. As is the case with all proxies, the assessor needs to be careful that the proxies used do indeed have a conceptually meaningful relation to the object of study. Thus, there are significant differences between approaches using indicators of forces, pressures, states and responses, an integrated index of all three, of environmental externalities (Hazell *et al.*, 2001), and of participatory monitoring of natural resources. Recent attention has focused on monitoring in a PRS context (Booth and Lucas, 2002), and on the definition of environmental indicators relevant to poverty reduction (Henninger and Hammond, 2000; Shyamsundar, 2002). Careful attention needs to be paid in the selection of indicators to capture those changes in environmental conditions that affect the poor the most.

## 6.1 Generic sets of environmental indicators

Several attempts have been made to develop generic or aggregated sets of environmental indicators. These include the efforts to establish a 'Working Set of Environmental Indicators' (Box 4) and the more recent attempt to use existing data to characterise the state of the environment within a single aggregated environmental sustainability index (World Economic Forum, 2001). Such approaches are predicated on the notion that effective environmental policy requires one or more simple figures to capture the condition of complex human-environmental systems in a form that is understandable to policymakers and the general public, similar to an economic indicator such as GDP. In practice, there are still major conceptual, methodological and data limitations associated with these initiatives (Niemeijer, 2002).

| **Box 4:** | **Working Set of Core Environmental Indicators** | | |
|---|---|---|---|
| **Issue** | **Environmental indicator** | **Additional refinements needed** | **Comments** |
| Government commitment | National strategies for sustainable development. Annual budget. | An expanded indicator that measures impact and quality. | Indicator improved by scoring for coverage, implementation and quality of efforts. |
| Water | Population with access to safe water. | Addition of a measure of sustainability of water supply. | An important human development indicator. |
| | Intensity of fresh water use. | - | Designed to measure constraints on agricultural and industrial production due to water scarcity. |
| Biodiversity | Land area protected. | - | Readily available but of limited value, as data on biodiversity in the protected areas is unavailable. |
| Energy and emissions | GDP per unit of energy use. | GDP (PPP) per unit of energy use with reference to different sectors. | - |
| | $CO_2$ emissions per capita and per country. | Adding methane emissions. | - |
| Air quality | Urban air quality, ambient concentrations of particulates. | Expanded coverage of cities. Addition of other pollutants. | The refinements have to be developed. |
| Land use | Forest area. | Wood harvesting intensity. | Crop productivity very country-specific. Forest area may be the preferred land-use indicator. |
| Marine environment | Mangrove areas. | Improve data coverage. | Not applicable to all countries. One indicator of the health of coastal ecosystems. |
| Desertificatio n | Percentage of national area subject to desertification. | A measure of both extent and degree. Data coverage. | Not applicable to all countries. Data issue needs to be solved. |

Source: World Bank, 2002 (Attachment F) based on OECD-DAC, 1999

The choice of indicators is often guided by data availability. In general, there is no causal relationships between national statistical indicators of environmental conditions and poverty

reduction. The following guiding principles may assist in overcoming some of the current challenges to developing generic or aggregated sets of environmental indicators.

Simplicity: Try to keep the choice of indicator as simple as possible, particularly in view of the time and resources required to collect and disseminate data. Use existing data sets and data collection/reporting systems whenever possible (e.g. nationally-owned *State of the Environment* reports and budgeting processes). Simplify professional ideals and initiate what is feasible within existing institutional contexts and fiscal constraints. For instance, geo-referenced photographs can constitute a useful proxy to costly aerial photography or satellite imagery. An indicator that cannot be properly monitored (verified) is worthless. An indicator is only relevant when it can be used in practice.

Utility: Define clearly *how* the indicators will serve different user groups, *how* the use of indicators will contribute to improving the conditions of natural resources, and to knowing who is poor, where the poor are located, and how they depend on and manage their environment and natural resources. Foster greater resource-user involvement in monitoring processes.

Integration of socio-economic data: Integrate socio-economic data regarding environmental resources, their uses and users. These may complement the commonly collected physical and biological data. Use existing data sets and data-collection and reporting systems whenever possible (e.g. living-standard measurements and demographic and health surveys).

Define baseline values: Establish and agree upon a clear baseline value or a reference state, even if it requires subjective judgment of what is considered 'normal' or 'acceptable'. This must often be made in the absence of reliable historical data.
Capacity assessment and development: Assess key data gaps and capacity-building that may be needed to improve data sets, data collection and data analysis (Appendix C). Data availability is a major problem requiring the use of more indirect measures. Ensure that monitoring is provided with adequate resources to be effective and accountable.

## 6.2 Sector specific indicators

## A. Indicators for environment and health

Urban migration and agricultural, industrial and urban development patterns in many developing countries have resulted in increasing numbers of people squatting on the peripheries of poorly-serviced towns and cities. Inadequate access to clean water supplies and the contamination of air, soil and water (associated with the growing demands for commercial energy, increasing traffic densities and the inadequate disposal of human, agricultural and industrial waste) expose urban communities to increasing health hazards. Increased health-care costs, loss of productive labour and the costs of 'cleaning up' pollutants are drains on already over-stretched and debt-ridden economies.

The choice of environmental health indicators (Box 5) will be guided by the relevance for the objectives of the intervention, and by professional health specialists.

| **Box 5: Selected Environmental Health Indicators** | | |
|---|---|---|
| *Environment-related illness* | *Intermediate indicator* | *Impact indicator* |
| Malaria | • Proportion of households having at least one treated bednet<br>• Percentage of health facilities reporting no disruption of supply of anti-malaria drugs for more than 1 week during the previous 3 months | • Malaria death rate<br>• No. of malaria cases, severe and uncomplicated<br>• Percentage of patients with malaria getting treatment at health facility and at community levels within 24 hours |
| Respiratory infections | • Availability of ventilation in cooking area<br>• Children sleeping in cooking area<br>• Percentage of households using clean fuels and improved stoves<br>• Lead levels in the blood of children | • Prevalence of acute and chronic respiratory infections<br>• Prevalence of chronic lung disease<br>• Lead poisoning |
| Diarrhea | • Access to safe water (private or public)<br>• Access to sanitation (private or public)<br>• Hours per day of piped water<br>• Quantity of water per capita per day<br>• Time taken/distance involved in collecting water<br>• *E. coli* per 100 millilitres of water consumed by source | • Prevalence of diarrhoea |
| Other | • Public health expenditure<br>• Accidents associated with the use of agroindustrial chemicals | • Infant mortality rate<br>• Under-5 mortality rate<br>• Disability Adjusted Life Years |

Source: Adapted from Shyamsundar, 2001.

## B. Indicators of environmental resources and economic opportunities

The environment in most developing countries provides the basis for agricultural, pastoral, forestry and fisheries production systems and for meeting the primary energy requirements of still predominantly rural societies. Indeed, the environment, as the source of natural capital, is the foundation for all economic activity. A frequent underlying cause of policy failure in the natural-resource sectors has been that policies have reflected the interests of the most powerful groups in a given society, and not those of society as a whole. The depletion of natural capital must be reduced by changing the resource use and waste generation of many non-poor groups, as well as improving poorer communities' access to, and benefits from the natural resources they require for their livelihoods.

The exact choice of indicators of environmental resources and economic opportunities (Box 6) will be guided by their relevance to the objectives of the intervention, and by sector specialists.

| **Box 6: Selected Indicators of Environmental Resources and Economic Opportunities** | | |
|---|---|---|
| *Poverty-related issue* | *Poverty-environment indicator* | *Problems of natural-resource management* |
| Incomes | Time to collect water and firewood<br>Distances to collect water and firewood<br>Percentage of annual household consumption from Common Property Resources (CPRs)<br>Percentage of annual household consumption from forestry and fisheries<br>Percentage of annual incomes managed by women from non-timber forest products (NTFPs) | Deforestation<br>Water scarcity<br>Governance of CPRs/open access areas<br>Lack of clear/enforced property rights<br>Deforestation and over-fishing<br>Restructuring of global commodity chains may affect local and regional sources of income and marketing arrangements |
| Adaptability and food security | Rural per capita cereal production<br>Percentage of annual household consumption from NTFPs when crops fail<br>Percentage of households without access to cultivable land<br>Percentage of households without access to irrigation<br>Percentage of households without small livestock<br>Percentage of rural children under 5 who are underweight, stunted or lost | Seasonal variations in food supply, labour availability and employment opportunities influenced by:<br>Land degradation<br>Deforestation<br>Water scarcity<br>(Predominantly male) migration |
| Vulnerability | People affected by floods, droughts, hurricanes, tsunamis, and landslides per year<br>Percentage of farmers growing high-yielding varieties<br>Percentage of women-headed households during the dry season | Natural disasters<br>Loss of agricultural biodiversity Incidence of pests<br>Low remittances and labour constraints limit investments in natural resources |
| Empowerment | Illiteracy rate (adult male and female)<br>Environmental information in school curricula<br>Well-functioning early warning systems<br>No. of joint resource management agreements<br>Percentage of national forest area under PFM<br>Proportion of formal legislation translated into local languages | Lack of information<br>State vs. local management of natural resources as custodians or as leaseholders<br>Gaps between formal and customary laws |

Source: Adapted from Shyamsundar, 2001.

Environmental indicators of relevance to the agriculture, water, and transport sectors and bilateral environmental programmes are presented in Appendices D, E, F and G, respectively.

# 7. Methods of sector monitoring

## 7.1 Ten Simple Steps

Ten simple steps for Embassy staff to improve the monitoring of environmental and natural-resource management in Danish development assistance are presented in Chapter 2.

## 7.2 Facilitate environmental monitoring in programme support

Where relevant, ensure that environmental monitoring and indicator development is included as a possible focus area in the Terms of References for Danida programme formulation and Annual Sector reviews. In some cases, sector programme support has provided opportunities to assist in the development of national impact monitoring systems (Box 7).

**Box 7: Developing a national impact monitoring system in Burkina Faso**
In Burkina Faso, Danida sector programme support for agriculture and natural-resource management has included assistance to develop both performance and impact monitoring systems of a national Land Use Management Programme (PNGT-2). The latter has included the definition of methodologies and conducting baseline studies with national institutions to monitor impacts in terms of household revenues and poverty, environmental conditions and deconcentrated institutional capacities.

## 7.3 Participatory monitoring

A range of stakeholders need to be involved in defining environmental indicators in relation to the agricultural sector. If relevant PRS indicators on environmental issues related to agriculture have been defined, such overall indicators should form the point of departure for indicator development. The Ministry of Agriculture must play a key role in defining indicators, but the environmental authorities must likewise be heavily involved. Various civil-society organisations also have significant insight into the relevance of various environmental indicators, and they too should be involved.

It is highly relevant to discuss environmental issues and how to monitor these with the producers themselves (Box 8). As far as possible, the associations of farmers or other producers should be involved in the process of defining environmental indicators for agricultural sector activities. Likewise, farmers/producers should be directly involved in monitoring the environmental problems that are of immediate relevance to them.

**Box 8: Involving civil society and out-sourcing monitoring**
With funding from Danida, the Cambodian government cooperates with the NGO Global Witness to monitor trends in illegal logging. Since the monitoring is undertaken by an independent organisation with effective communication abilities, the data is considered reliable by many people and the findings are being used by many different actors. Source: www.danida-cambodia.org

In Tanzania and other developing countries, Danida has pilot-tested natural resource monitoring schemes, in which the responsibility for monitoring is shared between the government and local stakeholders (e.g. communities and volunteers). Monitoring of natural resources by government staff is often costly and hard to sustain. In addition, such monitoring can be logistically and technically difficult, and is frequently perceived as irrelevant by local resource managers and local communities. When local stakeholders are directly involved in data collection and analysis, the monitoring is cheaper, and the chances of sustaining the monitoring may be better. Moreover, participatory monitoring can be rapid, locally relevant and capable of building capacity among local constituents.

In countries where Danida provides support for sector programmes of environment and natural resource management, it may be relevant for Embassy staff to facilitate the use of participatory monitoring of natural resources and the inclusion of locally-derived data at the national level, as inputs to programme/component monitoring (Box 9). The embassies may allocate separate budget items to facilitate sector or national monitoring workshops as a regular feedback and learning mechanism.

| **Box 9: Developing participatory monitoring of environment and natural resources** | |
|---|---|
| *Step* | *Activity* |
| 1 | **Discuss within the responsible institutions and with interested stakeholders the need for, and the aims of, participatory monitoring.** In particular, discuss: What questions do you want the monitoring to answer? What level of precision and accuracy is required? What incentives are required to ensure stakeholder engagement? |
| 2 | **Use existing knowledge, including that of villagers and local government staff, to develop a model of the system.** For example, the topic of interest may be the number of turtles than can be sustainably culled from an area. This cannot be measured directly, but developing a simple model of how this relates to measurements that are feasible and realistic for stakeholders to conduct (such as the number of nesting females on a communal beach) makes the limitations of the assessment explicit. |
| 3 | **Agree on an institutional framework for using the results of monitoring for adaptive management, preferably within existing institutions**. Agree on who takes decisions, and how monitoring results reach this body. Develop and agree on mandates and responsibilities. |
| 4 | **Develop a sampling strategy that specifies who measures what, how, where and when.** Identify which resources, areas, or resource uses are to be monitored. Design a sampling strategy which pays explicit attention to potential sources of bias, and in which the spatial and temporal deployment of sampling effort is appropriately stratified to maximise precision, given available resources. Train data gatherers to follow a common protocol which is written down; if guidelines and training materials from other monitoring schemes are relevant, ask to use them, and adapt the materials to the local context. |
| 5 | **Begin implementation on the ground**. Important steps include: Store data in its most disaggregated form and with details of how it was collected. Record sampling effort, who collected the data, and precise locations of study areas. Keep raw data for checking. Ensure that checks are carried out to keep errors at an acceptable level. Analyse the data, and feed results back to data gatherers. Provide results to decision-making body. |
| 6 | **Discuss the results with the local/national stakeholders and revise the strategy for the monitoring accordingly**. Address sustainability issues such as recurrent training needs. Keep track of management interventions resulting from the monitoring. Facilitate that data are regularly fed up to national level. Facilitate the development of national monitoring policy. |

Source: Danida symposium discussions 2004 (Danielsen *et al.*, 2005; and www.monitoringmatters.org).

# 8. Conclusions/challenges

Environmental considerations in Danish ODA have progressively and increasingly been accorded a high priority. Danida has an extensive commitment to environmental sustainability with a portfolio of sector programmes (and their components) and complementary funding mechanisms that encompass investments to improve natural-resource management, protect ecosystems, reduce pollution, and strengthen capacity for environmental management. The targets, principles, and priorities for Denmark's environmental assistance to developing countries are defined in the *Environmental Strategy 2004-2008*, which states that environmental assistance must contribute towards poverty alleviation, and so towards the realisation of the MDGs, which "form the basis for monitoring the entire effort" (Danida, 2004a: 22).

The development and analysis of information included in Annual Business Plans (VPA), combined with qualitative assessments using the rating system, are intended to indicate how Danida is contributing towards reducing poverty at the level of countries and sectors. In most programme countries, the MDG and PRS goals and indicators constitute the overall framework for poverty reduction. The definition of clear objectives, targets and indicators as a basis for a (more) coherent monitoring system often remains a major task for Danish Representations at the country programme level. The Technical Advisory Service (BFT) and the Quality Assurance Department (KVA) can, on demand, assist the Representations in developing results measurement at the country level.[2]

Additional efforts are also still required to integrate environmental considerations coherently and systematically into the planning, implementation, and monitoring of sector programme support. Performance is indeed improving. However, sometimes there is insufficient involvement of the actors most dependent on the environment, limited environmental data available and discrepancies between the priorities of donors and recipient countries. The staff of embassies and programmes can contribute to effective monitoring by:

- *Encouraging precise objectives*. If objectives are open to misinterpretation, monitoring will be difficult to design and implement.
- *Aligning programme indicators with national environment strategies.* The new consensus on aid management implies that monitoring should be harmonised in order to minimise the transaction costs of development cooperation. The indicators at the level of development objective (impact indicators) should be a subset of strategic-sector-plan indicators of the line ministries, be related to the MDGs to the extent possible.
- *Keeping the number of indicators low*. An excess of indicators leads to complex and impractical undertakings. In each component, there should preferably be only one indicator at the level of immediate objective (outcome indicator), and a maximum of three indicators at the output level (output indicators).
- *Strengthening interaction between embassies and projects/components.* Learning is too often left mainly to time-bound reviews and evaluations. Increased interaction will create learning and knowledge-based management to produce lessons learned, to document and share innovation, and to provide feedback for adaptive management.

[2] Terms of Reference for Monitoring Missions to Representations in Danish Programme Countries available at: http://monitoring.dccd.cursum.net

# 9. Appendices

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## Appendix B: Useful websites

| **Organisation** | **Website** |
|---|---|
| Danish Ministry of Foreign Affairs | http://um.dk |
| Netherlands Ministry of Foreign Affairs | http://www.minbuza.nl/gea/index.htm |
| Department for International Development | http://www.dfid.gov.uk/ |
| The World Bank | http://www.worldbank.org |
| Global Environment Facility | http://www.gefweb.org |
| Organization for Economic Co-operation and Development | http://www.oecd.org/env/soe/indicators.htm |
| Overseas Development Institute | http://www.oneworld.org/odi/keysheets/ |
| International Institute for Environment and Development | http://www.iied.org/resource |
| United Nations Environment Programme | http://www.unep.org |
| Food and Agriculture Organization | http://www.fao.org |
| The World Conservation Union | http://www.iucn.org/themes/ssp/baromsum.htm |
| World Wide Fund for Nature (WWF) International | http://www.panda.org/livingplanet/home.htm |
| World Resources Institute | http://www.igc.org/wri |
| World Conservation Monitoring Centre | http://www.wcmc.org |
| Centre for International Earth Science Information Network (CIESIN) | http://sedac.ciesin.org/entri/texts-home.html |
| International Institute for Sustainable Development | www.iisd.ca |
| United Nations Commission for Sustainable Development | http://www.un.org/esa/sustdev/isd.htm |
| Convention on Wetlands of International Importance, especially as waterfowl habitat | www.ramsar.org |
| Convention on International Trade in Endangered Species of Wild Fauna and Flora | www.cites.org |
| Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on substances that Deplete the Ozone Layer | www.unep.org/ozone |
| Framework Convention on Climate Change and the Kyoto Protocol | www.unfccc.org |
| Convention on Biological Diversity and the Cartagena Protocol on Biosafety | www.biodiv.org<br>www.biodiv.org/biosafe/protocol |
| Convention to Combat Desertification | www.unccd.int |
| Forest Principles | www.panda.org/tda/forest/new/ |
| Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal | www.basel.int |

## Appendix C: Capacity Development in Environment

The causal roots of environmental degradation often lie in institutional and policy issues rather than just in poverty as such. The relationship between poverty and the environment is mediated by institutional, socio-economic and cultural factors (Prakash, 1997: 23). Many of the difficulties confronting low- and middle-income countries have increased as a consequence of structural adjustment lending, the overall decline in ODA, the growing significance of the private sector and/or commercial aid flows and widespread generic capacity constraints.

Public-sector organisations continue to perform poorly in many developing countries. Ministries of environment are typically young, poorly staffed and hence weak organisations with limited political influence or fiscal support. They are often centralised with limited representation at the level of decentralised public-sector structures, and their mandates frequently overlap with other sectoral and non-sectoral line ministries resulting in institutional 'turf battles'.

Capacity Development in Environment (CDE) focuses on the ability of individuals, groups, organisations and institutions in a given setting to address environmental issues as part of a range of efforts to achieve sustainable development. The concept of CDE describes the process by which capacity in the environment and appropriate institutional structures are enhanced. The key underlying principles of the CDE concept are that it integrates environment and development concerns at all levels, aims to strengthen institutional pluralism, belongs to, and is driven by, the community in which it is based, and involves a variety of management techniques, analytical tools, incentives and organisational structures in order to achieve a given policy objective (OECD, 2000).

Danida's SPS invariably encompasses assistance for capacity building. This provides opportunities to improve environmental management which, in turn, can provide multiple opportunities to alleviate poverty, to reduce the burden of disease, and to empower the poor. The example of CDE from Benin (Box 10) highlights the key improvements made in undertaking environmental assessments in the roads sector during two triennia. In addition, CDE has contributed to an increase in the use of labour-based methods for road maintenance, more rigorous compliance by contractors with regard to OHS, HIV/AIDS and respiratory infections, as well as improved protection of sacred groves and other biodiversity sites.

**Box 10: Trends in capacity to undertake environmental assessments in the roads sector, Benin**

| **No. of road projects with** | **Period** | |
|---|---|---|
| | **1999-2001** | **2002-2004** |
| Environmental impact assessments | 4 | 21<br>(10 being finalized) |
| Environmental management plans | 3 | 10 |
| Environmental permits<br>(*Certificat de Conformité Environnemental*) | 2 | 9 |
| Environmental compliance monitoring by the Environment Unit within the National Directorate of Public Works | - | 12 |

Source: Danida, 2005b.

## Appendix D: Environmental indicators in the agricultural sector

In this context, agriculture covers crop cultivation, fishery, livestock breeding and forestry. The major environmental problems in countries where agriculture sector programme support is provided relate to: (i) decreasing soil fertility, (ii) pollution from indiscriminate use of pesticides, (iii) agricultural encroachment into, and impact on fragile lands and ecosystems (including watersheds, wetlands, key conservation habitats, erosion prone areas etc), and (iv) loss of diversity through increased focus on mono-cropping and on fewer and fewer seed varieties. These problems are among the environmental issues that need to be monitored in the agricultural sector.

Addressing environmental problems by directly seeking to support environmentally-friendly agricultural production methods can be a very important way of addressing environmental problems in the sector. Several ASPS components contain a range of activities in direct support of environmentally-friendly agricultural production (integrated pest management, soil fertility management, on-farm aquaculture development, community forestry etc.). Therefore, environmental monitoring in the agricultural sector should be integrated with performance monitoring of the key activities in the sector support as such.

Box 11 provides examples of key monitoring questions, sample indicators and means of verification or monitoring tools for typical components in the agriculture sector.

| **Box 11: Environmental monitoring of agriculture sector programme support** | | | | |
|---|---|---|---|---|
| **Examples of components** | **Key monitoring question** | **Sample output Indicators** | **Sample outcome indicators** | **Means of verification** |
| Support for government agricultural extension services, research and farmers' training | Does agricultural extension adequately address prioritised environmental issues in the agricultural sector? | Environmental considerations integrated in the training of agricultural extension staff<br><br>Extension materials address the most pertinent environmental problems in the agricultural sector<br><br>Farmer training modules on how to address environmental issues in agriculture are implemented<br><br>Innovative and environmentally sustainable production systems are researched and developed | Percentage increase in agricultural extension staff at all levels actively promoting sound environmental practises in agricultural development as well as being able to properly understand and train farmers in innovative and sustainable agricultural productions systems<br><br>Increase in no. of applied research initiatives that address environmental aspects in the research activities, including aspects of bio-safety. | - Reports from extension departments<br>- Interviews with extension officers (if carried out)<br>- Reports from research institutes and organisations |

| | | | | |
|---|---|---|---|---|
| Support for area-based and decentralised agricultural development | Are the supported agricultural production systems contributing to solving specific environmental problems of local significance? | No. of farmers trained/supported in integrated farming systems that use low levels of inputs and promote sustainable land use<br><br>Relative budgetary allocation of various local stakeholders and ASPS component to activities that actively promote sound environmental management.<br><br>No of organisations/civil society and private sector players involved in activities that promote sound environmental management | No. or percentage of farmers applying production methods that entail balanced use of fertilizers and pesticides<br><br>Percentage increase in areas under irrigation using improved and more efficient methods of water use<br><br>Percentage decrease in areas near livestock development infrastructure showing signs of severe and permanent erosion and/or pollution<br><br>Trend in inland fish stock development and long-term changes in size of area of natural wetlands crucial for inland fishing | - Baseline surveys and case studies<br>- Statistical data from various local government departments<br>- Progress reports<br>- Interviews with stakeholders (if carried out) |
| Support for institutional and policy development | Do national agricultural policies address key environmental issues in agriculture? | New or revised national agricultural policies and regulations have improved descriptions of how to address the key environmental concerns in agriculture | Increased no. of policy makers and implementers that actively promote the environmental strategies contained in the agricultural policies and regulations | - Policies and regulations<br>- Interviews with policymakers (if carried out)<br>- Reports from implementing agencies |

## Appendix E: Environmental indicators in the water sector

Danish assistance to the water and sanitation sector is mainly focused on support for components of drinking water supply (mostly rural, some urban) and sanitation (household latrines in rural areas as well as urban sewage networks), for components of water policy and institutional development, and increasingly for components of integrated water resource management. The increased focus on integrated water resource management also means that environmental indicators in this sector are increasingly shared with the agricultural sector.

Important environmental issues in the water sector relate to the quantity and quality of water. Water supply schemes may change the quantity of water in aquifers as well as in streams and rivers. This may lead to a change in habitat and species compositions of freshwater ecosystems. It may also lead to a change in the ability of wetlands to deliver important natural ecosystem services such as nutrient retention, sediment/toxicant retention and groundwater storage. Reduced water flow often results from diversion of water, e.g. for major water supply schemes for urban areas, for agriculture, for industry or hydropower. In some countries, climate change is likely to exacerbate problems of water insufficiency.

Water insufficiency may be a problem that water sector development programmes seek to address, and at the same time a problem to which water development is contributing. Whatever the reason, when water becomes scarce, it is an environmental problem that has a very negative impact on the poor. Monitoring the impact of water sector support programmes on water availability/quantity is therefore important.

Water quality is a serious issue in urban areas (where poor sanitation and water-borne pollution from industries are of grave concern) as well as in rural areas where human/animal pollution of drinking water, sedimentation from upstream erosion, as well as pesticide and fertiliser run-off from agro-industrial development create serious local environmental problems. Monitoring water quality is therefore important. Involving local people/communities in water quality monitoring is often extremely beneficial.

In many countries, data on water flow in major river basins and their associated wetlands is already being collected on a regular basis. Such data is typically compiled by national or regional river basin authorities. Many of these institutions have had significant donor support and have developed sophisticated databases. National hydrological research institutions or NGOs (e.g. Wetlands International, Ramsar Bureau, IUCN Wetland Programme, various national NGOs) are also likely to be involved in various forms of water-flow data collection. Data on water quality is frequently compiled by different types of water-supply companies, or by the governments' line agency responsible for water supply and sanitation, as well as by many city/town councils.

Related Poverty Reduction Strategy (PRS) indicators will normally stress the total number of people with access to clean water and proper sanitation. The development of environmental indicators in the water and sanitation sector should use such PRS indicators as their point of departure. In order to arrive at relevant environmental indicators, there is a need to develop indicators that build on information about changes in the pollution level of water sources and changes in the water availability of various water sources.

A range of different stakeholders need to be involved in defining environmental indicators in relation to the water and sanitation sector. The ministry responsible for water and sanitation must

play a key role in defining indicators, but environmental authorities must also be heavily involved. Local water and sanitation management bodies are important partners in indicator development. It is extremely useful to include associations and groups of water users, as well as various action groups on urban sanitation in both the process of indicator development and in collecting, analysing and using monitoring data.

Responsibility for taking action on the basis of environmental monitoring in the water and sanitation sector will rest with the agencies responsible for implementing the sector programme. Action needs to be taken by the authorities responsible for supplying water and sanitation services. Such authorities are often decentralised public institutions or water and sanitation supply companies. River-basin or watershed-management authorities could also take action. When supply schemes/infrastructure are supported in specific areas, it will often be appropriate to encourage the participation of local decision-making and management structures in compiling, analysing and using data and findings from the monitoring.

Box 12 provides examples of key monitoring questions, sample indicators and means of verification for typical components of the water and sanitation sector.

| **Box 12: Environmental monitoring of water sector programme support** | | | | |
|---|---|---|---|---|
| **Examples of components** | **Key monitoring question** | **Sample output indicators** | **Sample outcome Indicators** | **Means of verification** |
| Support for institutional and policy development | Are key environmental considerations integrated into the capacity-building and policy development? | Environmental considerations integrated into the training of water management authority staff<br><br>New or revised national water policies adjusted to accommodate environmental concerns (e.g. introduction of tariffs for water and sanitation) | No. of water management authority staff able to actively promote environmental issues in water management<br><br>New national water policies with environmental considerations are approved and actively promoted by government | - Staff performance appraisals (if carried out)<br>-Training materials<br><br>- Draft and final national water policies<br>- Documentation on active promotion of the new policies |
| Support for integrated water-resource management | To what extent is the support promoting a wise distribution of water?<br><br>What is the quality of the water to which poor people have access? | Water distribution issues openly discussed among water users<br><br>Water quality in selected representative sites | Critical low flows of key rivers and wetlands increased<br><br>No. or percentage of people with access to safe drinking water | - River flow statistics (if carried out)<br>- Minutes from meetings between water users<br>- Water quality assessments<br>- Interviews (if carried out) |
| Support for improving water supply and sanitation | Are sanitation practices among water users improved?<br><br>Is the water supply system promoting sustainable levels of water use? | Sanitary training properly undertaken in activities<br><br>Economic instruments and incentive structures for promoting water efficiency are in place | No. or percentage of people with access to sanitation facilities<br><br>Improved water efficiency from more effective operation and maintenance of wells and water supply schemes | - Interviews (if carried out)<br>- Training reports and training materials<br><br>- Progress reports on the functioning of wells and water supply schemes<br>- Documents on the economic instruments that regulate water use |

## Appendix F: Environmental indicators in the transport sector

The environmental and social impacts of roads affecting overall levels of poverty can be divided into those that are directly site-specific, and those that occur on a local, regional or global scale. The first type relate primarily to biological and physical impacts on the environment. These may include damage to sensitive habitats, local water resources and cultural, religious or sacred sites (including individual trees), barrier effects and easier access to previously unexploited land and forest resources; loss of flora and fauna, especially from land clearing or poaching by contractors and their road gangs; soil compaction, erosion, and siltation due to land clearing, stockpile management, or vehicle movements; water management problems such as flooding and ponding due to poor drainage management; soil and water pollution from materials-management and waste-management practices or accidental spills, notably of bitumen and hydrocarbons; air, dust, and noise pollution from construction vehicles and equipment, and road use in general; and land degradation and landscape impacts due to the lack of reinstatement of borrow pits and contractor sites. The exact nature of the impacts will depend on the type of project (new construction, rehabilitation or maintenance), existing road type, and the magnitude of changes in traffic volume. An increase in road transport use can also result in the second type of impacts that include noise, urban air pollution and greenhouse gas emissions, all of which are associated with health problems. The exact nature of these impacts will depend on the dominating mode of transport, previous air quality and the scale of changes in traffic volume.

There are also a number of related social impacts associated with road works. These include resettlement, and compensation issues (if the road alignment involves land acquisition), and labour issues such as labour standards, use of local labour, capacity of local contractors, and use of labour-based methods, if and when appropriate. Giving priority to intensive labour-based methods can also provide opportunities to promote women's access to technical training, employment opportunities, and decision-making. Health, safety, and accidents associated with road works and road use also require pro-active management. This may encompass the use of appropriate occupational health and safety measures, road safety during construction and operation, particularly in relation to raising awareness amongst children, and reducing the risks of diseases such as HIV/AIDS, malaria, and gastrointestinal or respiratory ailments on or near work sites. Simple and cost-effective techniques such as sprinkling water, particularly during the dry season, can significantly limit dust inhalation by local communities. Additional efforts may be needed to mitigate damage to existing transport services especially access and congestion problems.

Environmental policy and attendant sectoral legislation is often inchoate, and there is often little capacity to commission reviews, use EA and enforce mitigation measures prescribed in attendant Environmental Management Plans (EMPs) in national transport sector planning. This calls for restructuring and capacity-building in the roads sector. PRSs often stress the anticipated positive socio-economic impacts of reform and investment in the transport sector, without an effective basis for monitoring whether such benefits are accruing, and to whom. In order to arrive at relevant environmental indicators, there is a need to collect information about changes in policy and institutional capacities, to monitor the *actual* impacts on the biological and physical environment, and to assess changes in the socio-economic conditions of various social groups.

Environmental indicators in relation to the transport sector must be defined with a range of stakeholders. The ministry responsible for public works must play a key role in developing indicators in collaboration with the national environmental authorities. Deconcentrated public works, local government, Road Fund, Road Users' Associations, and urban public transport action

groups are also highly relevant to include, both in the process of indicator development and in collecting, analysing and using data. This also applies to stakeholders involved in implementation (design consultants, large and small contractors, workers, supervisors, women's groups, and NGOs).

Examples of key monitoring questions, sample indicators and means of verification in typical components in the transport sector are presented in Box 13.

| **Box 13: Environmental monitoring of transport sector programme support** | | | | |
|---|---|---|---|---|
| **Examples of components** | **Key monitoring question** | **Sample output indicators** | **Sample outcome indicators** | **Means of verification** |
| Support for institutional and policy development | Are environmental considerations integrated at all stages in road works? | Guidelines for environmental management established<br><br>Are they adhered to in:<br>- Feasibility studies<br>- EIAs and EMPs<br>- Contract specifications<br>- Implementation | Yes/No<br><br>Recommendations followed<br>Environmental management clauses included in contracts<br>Obligations adhered to<br>Mitigation satisfactory | Guideline documents approved/used inc. *i.a.* Environmental Law, EIA regulations and Environmental Management Guidelines<br>- Environmental Unit established in line ministry<br>- EIAs approved<br>- Contract documents<br>- Progress reports |
| Support for construction, rehabilitation and maintenance of trunk roads | What biological impacts will the road works have?<br><br>What impacts will the road works have on the physical environment? | Damage to or degradation of sensitive habitats and flora and fauna<br><br>Changes in soil, water and air quality including ambient concentrations of air pollutants in urban areas | Protected area network expanded using local government bye-laws<br><br>No. of reinstated borrow pits now used to water livestock | - Land use and land cover change assessments<br>-Water quality<br>- Bye-laws promulgated<br>- Regular compliance monitoring of EMPs<br>- Total and proportion of GHG emissions from the transport sector<br>- Interviews (if carried out) |
| Support for construction, rehabilitation and maintenance of secondary and feeder roads | Have socio-economic conditions improved?<br><br>Are Intensive Labour-Based Methods (ILBM) promoting sustainable road use and maintenance? | No or percentage of people with improved access to schools, health centres, and/or markets<br><br>OHS, HIV/AIDS and environment training systematically undertaken in road works | Rates of seasonal and/or permanent out-migration reduced<br><br>ILBM routinely adopted<br>in all secondary and feeder road maintenance | -Living Standard Measurement Surveys<br>-Demographic and Health Surveys<br>- Training reports and training materials<br>- Proportion of person kilometres travelled with motorised transport systems<br>- Interviews (if carried out) |

## Appendix G: Developing indicators for environmental programmes

Danish development assistance to the environment sector focuses mainly on so-called 'brown issues' (urban environment, including industries and waste management), 'green issues' (natural-resource management and conservation) as well as on environmental policy and institutional development.

If relevant PRS indicators have been defined regarding the environment, such overall indicators should serve as the point of departure for indicator development. When developing environmental indicators, the challenge is to identify meaningful indicators that are cost-effective to track. In practice, most environmental indicators focus either on the status of (i) the state of the environment (e.g. the quality of water, size of vegetation type blocks in priority areas), (ii) threats to the environment (e.g. levels of pollution, or urgency/intensity/area of threats to forests), or (iii) the processes that should be in place to protect the environment (e.g. government or private sector planning and management processes). Process indicators can, for instance, be the government's expenditure on environmental hazard prevention, or the number of small businesses that have adopted cleaner production technologies.

Indicators for environmental programmes need to be defined with a range of stakeholders. The Ministry of the Environment must play a key role in defining indicators, but government agencies responsible for other sectors such as industry, agriculture, forestry, transport, etc. must also play an important role. A large number of civil society organizations, including community-based organisations, national and international NGOs and academic institutions, have substantial insights into the relevance of different environmental indicators, particularly those of natural-resource management. It may also be appropriate to involve the private sector. For instance, private companies in the tourism sector depend on the environment, and could potentially contribute to monitoring marine resources, such as coral reefs. Box 14 provides examples of key monitoring questions, sample indicators and means of verification in typical components of environmental programmes.

**Box 14a: Component support for government capacity development and national environmental regulation**

| **Examples of intervention** | **Key monitoring question** | **Sample output indicators** | **Sample outcome indicators** | **Means of verification** |
|---|---|---|---|---|
| Formulation of environmental policy and legislation | Are improved environmental policies developed, approved and actively promoted? | Draft policy adjusted to accommodate stakeholder comments<br><br>New implementation guidelines produced | New national policy approved and actively promoted by the government | - Draft and final policies, legislation and implementation guidelines<br>- Documentation on active promotion of the new policies |

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| Capacity-building for the government in environmental planning and management | Are staff and government planning and management processes strengthened? | No. of government staff able to fulfil their job, e.g. to approve EIAs<br><br>New organisational plans and policies developed | Recipients of government's environmental services express improved appreciation of the delivery of the same services | -Organisational development plans and policies<br>- Results of staff appraisals (if carried out)<br>- Interviews with end users (if carried out) |
| **Box 14b: Component support for natural-resource management** | | | | |
| **Examples of intervention** | **Key monitoring question** | **Sample output indicators** | **Sample outcome indicators** | **Means of verification** |
| trengthening community-based natural-resource management | Are the natural resources of the target areas maintained?<br><br>Are local people's interests fairly represented in the local decision-making processes on natural-resource management? | District authority plans are aligned with community resource boards' activities in target areas<br><br>The Village Natural Resource Management Committees have broad community representation | Natural resource base in target sites maintained[1]<br><br>Change in extent of forest/wetlands (ha/year)<br><br>Area of forest/wetlands (or number of sites) where new resource management arrangements are in place<br><br>No. and percentage of representatives in natural-resource management institutions that are e.g. indigenous people<br><br>Proportion of the poor with secure rights of use over farmland | -Participatory monitoring of natural resources[1]<br>- Remote image analysis<br>- District authority plans<br>- Statistics on coverage of new resource management agreements (if the data is compiled)<br>-Membership lists of Village Natural Resource Management Committees<br>- Statistics on rights of use over farmland (if data is compiled) |

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| Improving management of protected areas | Are the natural resources of the protected areas maintained and the threats reduced?<br><br>Is the operation of the protected area network given increased attention by the government, and are staff, planning and management processes strengthened? | Threats[2] to biodiversity in target sites reduced<br><br>Management effectiveness[3] of target protected areas increased | Natural-resource base in target sites maintained[1]<br><br>Change in extent of forest/wetlands (ha/year)<br><br>Government expenditure on protected area management | -Participatory monitoring of natural resources [1]<br>- Remote image analysis<br>- Threat Reduction Assessment<br>- Government expenditure and budget control<br>-Filled-in scorecards on management effectiveness |

[1]Based on e.g. (i) changes in number of sightings of designated species and local resource uses; (ii) changes in size of vegetation type blocks and in land use of priority areas; and (iii) changes in perceived harvest volumes of non-timber forest products.

| **Box 14c: Component support for cleaner production in industry** | | | | |
|---|---|---|---|---|
| **Example of intervention** | **Key monitoring question** | **Sample output indicators** | **Sample outcome indicators** | **Means of verification** |
| Support to improve environmentally-friendly production processes in industry | Are the production processes in industry becoming more environmentally-friendly?<br><br>Is environmental hazard prevention given increased attention by the government? | Demonstration projects carried out<br><br>No. of poor people affected by pollution hazards<br><br>Quantity of source segregated waste received at waste dumps per day; waste is no longer visible at location of previous dumps<br><br>Guidelines and manuals produced | No. of small businesses that have adopted cleaner production methods<br><br>Government expenditure on environmental hazard prevention | - Statistics on small businesses (if compiled)<br>- Progress report data on demonstration projects<br>- Pollution hazard assessments (if carried out)<br>- Waste dump statistics<br>- Guidelines and manuals<br>- Government expenditure and budget control |

| Box 14d: Component support for urban environmental management | | | | |
|---|---|---|---|---|
| **Example of intervention** | **Key monitoring question** | **Sample output indicators** | **Sample outcome indicators** | **Means of verification** |
| Support to improve environmental management in cities | Are urban environmental conditions improving?<br><br>Are urban environmental issues given increased attention by the City Council? | No. of demonstration projects completed<br><br>No. of local environmental action plans developed and approved<br><br>Vehicle emission standards approved by government<br><br>Proportion of funds administered through City Environment Development Fund coming from sources other than Danida | Percentage of people living in substandard housing<br><br>Percentage of people living in areas prone to flooding<br><br>Access to sanitation facilities by women<br><br>No. of households receiving good quality water of guaranteed supply<br><br>New Environmental Strategy approved and actively promoted by City Council | - Urban environment assessments (if carried out)<br>- Progress report data on demonstration projects and local environment action plans<br>-Vehicle emission standards<br>- City Council expenditure and budget control<br>- Draft and final Environmental Strategy of City Council<br>- Documentation on active promotion of new Environmental Strategy |

| Box 14e: Component support for civil society | | | | |
|---|---|---|---|---|
| **Example of interventions** | **Key monitoring question** | **Sample output Indicators** | **Sample outcome indicators** | **Means of verification** |
| Capacity building for NGOs and other civil-society organisations working on environment and sustainable development | Are the organisations' staff, planning and management processes strengthened? | No. of advocacy initiatives on environment and sustainable development | No. of organisations' achievements as a result of advocacy on environment and sustainable development | - Press clippings and other media coverage reflecting initiatives and achievements of advocacy on environment (if compiled) |

| Box 14f: Component support for environmental education | | | | |
|---|---|---|---|---|
| **Example of intervention** | **Key monitoring questions** | **Sample output indicators** | **Sample outcome indicators** | **Means of verification** |
| Support to integrate environmental issues into the curricula of schools and other educational institutions | Are environmental issues integrated into the education system?<br><br>Are environmental issues paid increased attention in the general development of the education sector? | Course delivery and curriculum revised<br><br>New education materials produced<br><br>Strategies and policies of the Ministry of Education are reflecting the need for environmental education | No. of schools using new education materials<br><br>Strategies and policies of the Ministry of Education are reflecting the need for environmental education, and these policies are actively promoted | - Draft and final school curricula and course plans<br>- School statistics on materials used (if data compiled)<br><br>- Strategies and policies of Ministry of Education<br>- Documentation on active promotion of new strategies/policies |