



Needs Assessment
For
Identification of Environmental Priorities in Iraq

8th October 2003

UNEP/DEPI/Post-Conflict Assessment Unit
Geneva, October 2003



Table of Contents

Table of Contents	2
1 Environmental Needs Assessment	3
2 Environmental Context	3
2.1. Physical Environment	3
2.2. Organisational Environment	4
3 Environmental Priorities for Iraq	5
3.1. Capacity Building for Environmental Governance	5
3.2. Environmental Site Assessments for Existing and New Facilities and Programmes.....	8
3.3. Environmental Clean up and Infrastructure Upgrades.....	10
3.4. Environmental Awareness Building	12

1 Environmental Needs Assessment

Following the launch of the revised Humanitarian Appeal for Iraq on 23 June 2003, which covered the emergency requirements of the country until the end of the year, the focus of the United Nations (UN) efforts shifted towards promoting an effective transition towards recovery and reconstruction.

Based on discussions between the UN, World Bank and IMF, deliberations during the technical meeting on 24 June 2003 and subsequent consultations with the Coalition Provisional Authority (CPA), 14 priority sectors have been identified for the needs assessments. In addition, human rights, gender, environment and institutional capacity were identified as cross cutting themes. United Nations Environmental Programme (UNEP) was identified as the lead agency for the environmental sector. This report presents the findings of the UNEP work to identify the priority needs in the environmental sector in post war Iraq.

The environmental needs assessment is based on the following:

- **Interaction with Iraqi Stakeholders:** UNEP conducted two fact-finding missions (8-28 July and 8-27 August) to Iraq to collect information on environmental needs, to meet with key Iraqi environmental stakeholders (Ministries, University/Research Institutes, members of Governing Council, and the CPA), and, to work with available UNDG task managers.
- **External Stakeholders Workshop:** UNEP conducted an external stakeholders workshop ("roundtable") in Geneva on 29 August 2003, where environmental needs in Iraq were discussed with several UN agencies, international environmental NGO's and donors, who had expressed interest in Iraqi environmental issues.
- **Interaction with UNDG Teams:** During the missions and afterwards, the UNEP team interacted with the various sectoral teams undertaking needs assessment. For each of the sectors identified in the UNDG process, key environmental needs were identified and wherever possible detailed cost estimates for specific remedial/improvement actions were suggested.

A review of the 14 UNDG Sector Reports by UNEP indicates that a number of environmental concerns, such as sewage treatment and waste management, have been included in other reports and, hence, this environmental needs report highlights those issues not covered by other sector reports. It is important to emphasize that environmental and sustainable development issues need to be integrated into all of the Iraqi reconstruction programs.

2 Environmental Context

2.1. *Physical Environment*

The past and recent conflicts, combined with years of environmental neglect and mismanagement have led to serious environmental challenges in Iraq. The looting which followed the fall of the

regime has also exacerbated the environmental damages. The main areas of environmental concern can be sub-divided into the following chronic and conflict-related issues:

- Chronic Degradation of the Environment
 - **Sewage:** under-capacity and breakdown of sewage collection and treatment systems
 - **Waste:** breakdown in collection systems for municipal solid and clinical waste and inappropriate disposal systems
 - **Water:** pollution by disposal of raw sewage and untreated industrial effluent
 - **Natural resource depletion:** including desertification and deforestation
 - **Mesopotamian marshlands:** widespread habitat loss
 - **Military and industrial activities:** lack of pollution control management and equipment

- Conflict Related Environmental Damage
 - **Depleted uranium:** targeted sites (buildings and military hardware)
 - **Oil Trenches:** deliberate set on fire
 - **Looted Facilities:** resulting in spillages of hazardous materials and removal of plant and equipment
 - **Sabotage/accidents:** such as the sulphur mine fire and oil pipeline explosions
 - **Hazardous military hardware:** containing UXO, asbestos, PCB's and heavy metals

The existing problems are compounding humanitarian conditions and threatening both human health and livelihoods. In addition to the direct environmental problems created by the looting which followed the fall of the regime, the looting also drastically reduced the capacity of the administration to respond to environmental emergencies. If left unaddressed, the environmental problems will undermine sustainable development, and become a barrier to peace, economic growth, national stability, and long-term improvements in the quality of life of the people of Iraq.

2.2. Organisational Environment

There is a well-established structure for environmental administration in Iraq. Strengthening the existing environmental governance structure will be fundamental to improving environmental quality in Iraq. Under the 1997 law, the Environmental Protection and Improvement Directorate (EPID) (a unit of the Ministry of Health since 1975) was designated as an independent body and formally disassociated from the Ministry of Health. The Environmental Protection and Improvement Council, a body of senior officials from various agencies, provides oversight to the Directorate. The new law also established environmental councils and EPID branches at the Governorate level, and this directive has been implemented in all 15 governorates.

EPID is a sizable national institution and is relatively well resourced, with 656 employees almost equally partitioned between Baghdad (330) and the 15 Governorates (326). In addition there are about 70 staff in the Iraqi Kurdistan. In terms of staffing, this makes EPID equivalent to some existing ministries. Most of EPID's staff are technocrats (mainly engineers and medical doctors), a substantial proportion of whom are young professionals and women.

UNEP held consultations with the EPID during the field missions in July and August 2003, to better understand their capabilities, resources and resource needs. During the missions, UNEP

also learnt that environmental administration was undertaken in a decentralized manner with environmental units in at least three other Ministries (Water Resources, Industries, Oil). However the lack of resource allocation in the period prior to the conflict and the extensive looting which followed the war has substantially diminished the capacity of the various environmental enforcement agencies to act as an effective agent for environmental governance. On 1 September 2003, it was announced that a new Ministry of Environment had been created based on a core of the existing EPID with HE Abdul-Rahman Sidiq Kareem as Minister.

This report includes the findings of the consultations, including the short and medium term resource needs.

3 Environmental Priorities for Iraq

Environmental Priorities for Iraq can be divided into four distinct groups;

1. Capacity Building for Environmental Governance
2. Environmental Site Assessments for Existing and New Facilities and Programmes
3. Environmental Clean-Up and Infrastructure Upgrades
4. Environmental Awareness Building

3.1. Capacity Building for Environmental Governance

3.1.1 Immediate Priorities

New Constitution: As the process has begun to draft the new constitution of Iraq, it is important to try to incorporate an explicit commitment to Sustainable Development within the guiding principles. This will not only align Iraq with other countries committed to the Rio Declaration, but in particular assist Iraq, dependant upon a non renewable fossil fuel as its prime mover for economic development, to avoid over exploitation and promote diversification of the economy.

Strengthening Environmental Governance at the National, Governorate and Local Levels: A new Ministry of Environment has been established with the existing EPID as the core of the new Ministry. Environmental units also exist in at least three other ministries (agriculture, industries, oil). During our interaction with the Iraqi environmental administration at the national and governorate level, it became obvious that there exists a relatively sophisticated administrative structure and staffing to monitor and manage environmental issues. The challenge facing the Iraqi administration and the international community is to enhance the capacity and skills of the environmental administration by training them on environmental best practices and providing them with sufficient equipment, operating budgets and guidelines to initiate environmental monitoring, clean up and conduct proactive environmental assessment and management.

Interim Guidelines for Environmental Impact Assessment: In order to fully integrate environmental considerations into the reconstruction and development process, a strategic environmental assessment of the national development plan should be carried out. In addition, all proposed projects should be subject to interim environmental impact assessments, while all existing industrial locations, municipal facilities and waste disposal areas should undergo an environmental impact assessment/environmental due diligence review. The environmental impact

assessment process should result in the issuing of an environmental permit for all potentially polluting activities, and follow-up monitoring should be conducted to ensure compliance.

Industry Guidelines and Best Practices: Sectoral guidelines and occupational health standards need to be created and industry management and staff need to be made aware of to prevent immediate health impacts. The task will include creating such guidelines and conducting awareness sessions for industry management and staff. Given the plans to introduce a free trade regime for agricultural inputs, there is a need to develop guidelines for use of pesticides and their application methods.

Guidelines for Site Decommissioning and UXO Disposal: Guidelines should be developed on environmentally acceptable methods for the decommissioning of the military sites identified during the assessment as well as for the disposal of UXOs and other chemical inputs and wastes.

Promoting Private Sector Environmental Consultancies: Environmental practitioners in the private sector are virtually absent in Iraq currently, but international financial institutions and donor agencies will require environmental assessments and audits as part of investments and take-overs. One can expect a rush of international consultants to fill this vacuum in the short term. There is however Iraqi environmental expertise available outside Iraq and within university and other institutions within Iraq who could be encouraged to set up private sector environmental consultancies. Seed capital and training may be provided to establish and promote this new service sector.

3.1.2 Medium-Term Priorities

Reintegration into Regional Organisations: Iraq is a founding member of the League of Arab States (LAS) and the Council of Arab Ministers Responsible for the Environment (CAMRE). Iraq is also a signatory of the Kuwait Convention, on the bases of which ROPME Secretariat was established, with Iraq being a member of the Executive Committee (EXCOM) of the organization, which is a ministerial committee overseeing the development and follow up of implementation of the strategy. The ROPME Council in its 13th Session (24 September, Jeddah), has welcomed Iraq's interest in reactivating its role in ROPME (Decision CM12/31). The fact that Iraq now has a Ministry for the Environment should further facilitate their integration into the sub-regional and regional programmes. There are a number of environmental initiatives being undertaken in the region (such as Global International Water Assessment (GIWA) for the West Asia Region, Sub-regional Action Programme to combat desertification in West Asia, review of Environmental law in West Asia etc.) and Iraq would benefit from active participation in the same.

Promoting National Civil Society Organizations and Engaging International Community: In the past 20 years, there has been limited activity of environmental civil society organizations (CSOs) as well as poor participation in regional environmental co-operation and international environmental agreements. During 2004 groundwork needs to be done to strengthen the Iraqi civil society organizations working in the area of environment. Regional and international environmental cooperation must also be revitalized, including the ratification and implementation of multi-lateral environmental agreements.

Refurbishment of Environmental Research Institutes: Following the 2003 conflict, the main environmental scientific research facilities were looted of equipment and furniture including the

Dams and Water Resource Center and the Natural History Research Center at the University of Baghdad, the Marine Sciences Center and Centre of Gulf Studies at Basra University, and the Department of Building and Construction at the University of Technology. An assessment should be undertaken to identify the equipment, furniture and library materials that are urgently required for these scientific facilities to restart their environmental research and monitoring programmes. Subject to the assessment, the most urgent equipment and training needs should be met.

Development of a Land Policy and Management Plan: There should also be more emphasis on 'soft' infrastructure relating to sustainable water and land governance and use issues from the onset, emphasizing the need for an integrated land-water approach. More specifically, there should be an assessment of water and land policy, management, legal frameworks and institutions and a preparation of a programme for their reform.

Development of Water Allocation Guidelines to Maintain Ecosystem Functions: Water allocation to maintain environmental quality of wetlands, the Shatt al-Arab estuary, and the marine environment of the northern Persian Gulf should be integrated within the water management plan in order that these ecosystems can continue to provide their many goods (fisheries, livestock grazing, reeds, waterfowl) and services (waste treatment, flood mitigation, climate moderation, tourism) to people. In addition, cost / benefit analysis should be undertaken for maintaining wetland ecosystems compared with other uses of water.

Inclusion of All Stakeholders in Regional Discussions on Water Basin Management: Any regional discussions on water basin management must include all relevant countries and regional organizations. In particular Iran and the Regional Organization for the Protection of the Marine Environment (ROPME) should be added to the list of stakeholders. There are no additional costs associated with the inclusion of additional stakeholders, provided the stakeholders are responsible for costs of participation.

Development of a White Paper for Integrated Transport: The challenge to restructure the entire transport system in Iraq is at the same time an opportunity to modernise the system in order to reduce environment and health impacts. Therefore careful planning and prioritising are required within an overall transport strategy. The strategy should take an integrated approach and cover all modes of transport (including non-motorised transport options). A task force composed of representatives of the groups working on the various sector master plans suggested in the report could be set up, supported by external consultants.

Fuel Quality Standards: Develop fuel quality standards, taking into account the phase out of lead in gasoline, and lower levels of sulphur, benzene and aromatics. Promote the phase out of lead and the introduction of low sulphur/benzene/aromatics fuels by raising awareness of the greater public (campaigns) and using incentives (either subsidies to unleaded/low sulphur/benzene/aromatics fuel or higher taxes for leaded/high sulphur/benzene/aromatics fuel). Promote the use of natural gas through awareness raising campaigns, and incentives to natural gas (subsidies/taxes) and purchase of natural gas vehicles.

Regulatory and Pricing Issues: The modernization of the existing electricity sector legislation and regulatory processes should take into account the incorporation of environmental standards and regulations which should be adhered to by both public and private sector entities involved in the provision of electricity services. Environmental regulation based on the *polluter pays* concept

should be introduced. Electricity pricing policies should also take into account the environmental impacts of cheap/subsidised power on water resources and other energy “inefficient” industries. A review of the existing structure and policies with a view to prepare a roadmap for a more environmentally friendly electricity sector should be undertaken during 2004.

Environmental Land-Use Planning: Iraq has limited land-use planning policies and strategies, hence, procedures should be developed for identifying and controlling development on areas of contaminated land, areas subject to flooding, areas of cultural/archaeological importance, seismic activity and nature reserves (wetlands or endangered species habitats).

Sustainable Construction Design and Building Codes: The current construction and building codes are limited to government buildings and so the new codes should include sustainable development criteria, such as the potential for reusing construction and demolition (C&D) waste (crushed concrete, etc.), energy efficient materials (solar heating, lighting, thermal insulation, etc.), use of CFC-free refrigerants in air conditioning units and cement derived from kilns co-fired with tyres/hazardous waste.

International Co-operation and Funding Opportunities: In the past decade Iraq has not been a party to the developments in the international environmental arena. Also Iraq’s participation in international environmental organizations has been minimal due to resource and other constraints. It is important that Iraq conducts a thorough assessment of the various international conventions and organizations, including availability of funds and transfer of technology, to identify and prioritize the joining of these conventions and organizations.

National Environmental Contingency Plan: As a major oil exporting country, operating an old infrastructure, the risk of oil spills causing environmental impacts is high in Iraq. In the past decade, environmental aspects associated with such incidents has not been given high priority as maintaining production was the key to survival. It is important that a national environmental contingency plan is now drawn up which can react swiftly to oil spills on both land and sea and ensure that the environmental impacts of oil spills are managed. Since Iraq is an industrialized economy, this structure can also cater to emergencies in other sectors, such as chemicals.

3.2. Environmental Site Assessments for Existing and New Facilities and Programmes

3.2.1 Immediate Priorities

Assessment of Environmental Threats to Human Health: Due to two decades of conflict and inadequate environmental management, Iraq currently has a number of contaminated sites that have the potential to pose risks to human health and the environment. These sites have been contaminated by the release, accidental discharge and/or deliberate dumping of industrial wastes and hazardous materials due to conflict damage, neglect and/or lack of resources and capacities. An immediate assessment is needed to identify the location of the contaminated sites and to provide recommendations for risk reduction and remediation.

Assessment of Environmental Threats to Human Livelihoods: Iraq’s natural resource base has been severely degraded by overexploitation and mismanagement in the latter part of the 20th century. As a result, serious degradation of waters, forests, soils and biodiversity resources is

currently threatening human livelihoods and ecosystem services. An immediate assessment is needed to identify the existing levels of natural resource degradation and to provide recommendations for rehabilitation, recovery and sustainable use. In particular, urgent attention is needed to develop an integrated strategy for the environmental, economic and social recovery of the Mesopotamia Marshlands.

Epidemiological Surveys: A number of reports are already circulating about the possible public health risks from environmental contamination (sewage, looted radioactive facility in Thuwaita, toxic chemicals, DU, etc.). It is therefore important that the Ministry of Health initiate epidemiological surveys around contaminated sites jointly with the new Ministry of Health.

Environmental Assessment of Arms Stockpiles and Related Industries: The former Iraq regime had achieved a high level of militarization through its Ministry of Industrial Militarization. Although the Ministry now has been disbanded, decommissioning of the arms stockpiles and related industries in an environmentally acceptable manner needs to be undertaken in 2004. The decommissioning process should begin with an environmental assessment survey of all arms stockpiles and military industries and locations where UXOs were detonated in the past (by UN inspectors and Iraq).

Depleted Uranium (DU) Assessment: During the First Gulf Conflict in 1991, 300 tons of DU ammunition (50 tons in ground-to-ground and 250 tons in air-to-ground attacks) were used. In the 2003 conflict, US Central Command and the UK confirmed the use of DU by coalition forces on the 26 March 2003, however, the total amount of DU used has not been provided. Given the potential environmental risks associated with the use of DU ammunitions, an environmental assessment is urgently needed followed by public awareness campaigns and clean-up operations if necessary. The environmental assessment should include the following tasks: site identification, development of GIS database, field surveys, sampling and analysis and completion of a health risk assessment. If significant health or environmental risks are confirmed from the DU assessment, a public awareness campaign should be undertaken in order to notify the public of the danger of DU. The campaign should include radio and TV broadcasts, leaflet distribution, training for civil protection authorities and schools education campaign.

Assessment of Industrial Hazardous Waste: Hazardous waste is primarily generated by oil and petrochemical complexes, fertilizer plants, refineries and chemical plants plus small and medium-sized industries such as electroplating, tanneries, workshops and garages. There is no reliable data available for review, hence, the first task would be to undertake a hazardous waste composition survey (types, volumes, etc.), review of existing treatment facilities including the possible use as fuel in cement kilns and assessment of available technologies. In addition, capacity-building for environmental regulators and awareness training for industry including promotion of minimization and segregation should also be undertaken.

3.2.2 Medium Term Priorities

Environmental and Social Impact Assessments for New Hydraulic Infrastructure: Prior to construction of new hydraulic structures, particularly for the two proposed dams in the northern Iraq, environmental and social impact assessments should be conducted.

Assess Sustainability of Irrigation Schemes Prior to Rehabilitation: Rehabilitation of irrigation infrastructure should include an assessment of their economic and environmental sustainability, using true economic costs and benefits. Both market and policy distortions in the pre-war period may have caused investment in economically unrewarding and environmentally damaging irrigation schemes. In this context, it is not only an issue of improving the technical efficiency of existing irrigation schemes but also of re-evaluating the economic and environmental sustainability of the hydraulic infrastructure.

Due Environmental Diligence Audit of Industries: Due to resource shortage and lack of enforcement of environmental regulations, many industrial facilities have not been following appropriate environmental practices in air pollution control, solid waste management and effluent treatment. The looting which followed the occupation has worsened the situation. Environmental due diligence audits of all state owned enterprises including oil, nuclear and military based industries are necessary to assess the environmental liabilities associated with the facilities including contaminated land and pollution control upgrade cost estimates.

Survey of Wrecks in Shatt Al-Arab and Umm Al-Qasr port: A survey should be conducted on the status of the remaining wrecks (approximately 282) by the Ministry of Transport and Telecommunications, in accordance with the survey guidelines that were developed by the ROPME Task Force Meeting on the Removal of Wreckage from the Northern Part of the ROPME Sea Area. The Ministry of Environment should provide a technical expert to participate in the environmental components of the survey. The survey should attempt to rank the wrecks according to potential navigational and environmental risks in order to establish a prioritized list for removal. The survey should also attempt to identify suitable locations for the storage and processing of hazardous wastes that may be contained within the raised wrecks.

Environmental Management of Diesel Generators: Given the current electrical power reliability problems it is expected that diesel-based stand-alone generation will further increase as a cheap and reliable solution. In the immediate to short-term, an environmental management program could be introduced to ensure the safe storage and handling of diesel fuel and diesel engine oil, as well as safe disposal of used diesel engine oil. Key objectives of this program are to prevent leaks and spills of diesel fuel and disposal of used diesel engine oil in open land fields, both of which cause contamination of soil, surface water, and/or groundwater resources.

3.3. Environmental Clean up and Infrastructure Upgrades

3.3.1 Immediate Priorities

Emergency Clean-up of Contaminated Sites : Iraq has a number of contaminated sites which are currently posing a risk to human health and the environment including landfills, targeted industrial facilities, oil pipeline explosion sites, etc. While proper assessment and complete clean-up of these contaminated sites will be a task to be undertaken for many years to come, it is necessary to have funds available for emergency closure, containment, relocation and limited clean up of sites posing immediate danger to public health. This work is to be done in association with other sectors, such as Industries, Oil, Mine Action and Agriculture.

Disposal Facilities for Clinical Wastes: There is no proper system for collection and disposal of clinical wastes at present in Iraq. It is a matter of urgency that guidelines are prepared for separate collection and safe disposal of clinical wastes in all hospitals and clinics.

Survey and Disposal of Obsolete Pesticide Stocks: There is a need to survey the large stock of obsolete pesticides in Iraq and develop a programme for their safe disposal. For example, the agricultural warehouse in Al-Suair still holds pesticide stocks dating from the infamous mercury-poisoning incident of the 1970s.

3.3.2 Medium Term Priorities

Combating Land Degradation: Adaptive-management practices, technologies, policies and incentives to arrest land degradation should be developed and implemented. These could include promotion of the following activities: minimum tillage, contour farming, replenishing soil fertility with leguminous plants, sand dune fixation and green belts.

Rehabilitation of Ecosystems of Importance to Vulnerable Groups: Support to vulnerable groups in Iraq should recognise that these groups mainly subsist on marginal and fragile environments, such as steppes, wetlands and forests. For example, in the centre and south of Iraq wetlands comprise an important resource for IDPs and women headed households including small-scale subsistence agriculture, domestic water supply and other uses that contribute directly to poverty alleviation. As such, activities targeting the rehabilitation and sustainable use of these stressed ecosystems should be developed and incorporated in the humanitarian assistance package to vulnerable groups.

Risk Reduction and Clean-up of DU Contaminated Sites: If significant health or environmental risks are confirmed from the DU assessment, risk reduction and clean-up measures will need to be implemented to protect human and environmental health. It is anticipated that Mine Action services would be the focal point for DU clean-up tasks if deemed necessary. Severely impacted sites should be isolated to prevent access including the erection of fences, and warning sign-posts. A clean-up programme will need to be undertaken at high-risk sites.

Remediation of Former Landfills: The uncontrolled landfilling of waste can result in contamination of water supplies by leachate, exposure to disease vectors (flies, rodents, etc.), landfill gas explosions and subsidence/collapse. An environmental assessment of these landfills should be undertaken and appropriate remedial works initiated.

Promoting Renewable Energy: As Iraq's economy begins to reach its potential, energy requirements will multiply faster than the national grid systems can supply. This will include an explosion in number of diesel generators. However with clear economic instruments, it will be possible to steer some of these demands to solar power, particularly for home and small and medium scale, for water heating.

Environmental Improvements in Existing Power Plants: Pollution control systems should be installed in all power plants, based on the findings of environmental due diligence audits. The environmental improvements should also aim at reducing greenhouse gas (GHG) emissions and non-GHG emissions such as NO_x (nitrogen oxides) and SO₂ (sulfur dioxide). An Acid Rain Program may be introduced where annual NO_x and SO₂ emission limits are imposed on power

generation plants, and through which each utility will select the most suitable and cost effective means by which to comply with the emission limits. Possible measures should include switching from fuel oil and diesel to natural gas (high-carbon to low-carbon content fuels and improvements in power plant production efficiency).

Energy Conservation: The government should promote the use of energy efficient appliances through suitable mandatory and voluntary programs accompanied by national awareness campaigns. In addition, demand-side energy management programs, by large commercial electricity consumers, should be encouraged through use of policy instruments like peak-load pricing and time-of-use rates.

Repair & Construction of War Damaged Houses: Construction and demolition waste (C&D) potentially including unexploded ordinance, depleted uranium and asbestos maybe encountered during redevelopment works. Prior to the removal of C&D waste an UXO/DU/asbestos assessment of the waste should be undertaken and, if identified, the waste should be segregated and isolated (fencing and sign-posts) pending an appropriate treatment/disposal route.

Urban Wastewater Management: Urban wastewater management systems should be developed that include the segregation of surface and sanitary wastewaters and greywater re-use. Initially, an assessment of the networks should be undertaken, followed by a detailed survey of the existing surface and sanitary network in the major Iraqi cities should be undertaken and hydraulic models/remedial costs developed.

3.4. Environmental Awareness Building

Environmental Awareness Building: Environmental awareness building is integral to ensuring sustainable improvements in environmental quality and in preventing immediate danger to populations from exposure to risks from hazardous materials and toxic contamination of air, soil and water resources. During 2004, awareness raising should be conducted through the use of TV and media campaigns, followed by efforts to integrate environmental issues into educational curriculum at the national and local levels.

Development of environmental education curriculum at all levels: It should be specifically recognized that the sustainable reconstruction of Iraqi will depend in part on integrating economic, social and environmental factors into the decision making process. It is therefore essential that environmental education is developed and integrated into the Iraqi curriculum at all levels. This process should start with an assessment that considers the current environmental content offered within primary, secondary and tertiary curriculum and proposes a framework for the integration of environmental issues as well as a teacher training strategy.

Development of non-formal opportunities for environmental education: There is a critical need to revitalize public awareness on environmental issues to both protect human health and to enable meaningful participation in decision-making. A strategy should be developed by the Ministry of Education in collaboration with the new Ministry of Environment to determine how non-formal environmental education can be brought to Iraqi citizens including religious leaders, farmers, decision makers, and non-governmental organizations.

Environmental Education Practitioners Network: To facilitate the development of new environmental curriculum (both interim and final) as well as opportunities for non-formal education a network of Iraqi academics with experience and expertise in environmental education should be established. The network will work with other international experts to review the education curriculum from primary to tertiary levels of education and to assist in the curriculum process.

Interim Teacher Training on Environmental Education: Prior to the development of new curriculum, interim teacher training on environmental issues should already be conducted. There are many environmental issues in Iraq that may pose health risks to children including hazardous wastes, depleted uranium, and industrial sites. Teachers should already be made aware of key risks in order to raise student awareness and protect health.

Training of agricultural extension staff in sustainable agriculture issues: Rebuilding of the agricultural research and extension services should include capacity building and training activities in sustainable agriculture issues including water and soil conservation, landraces conservation, reforestation, and sustainable farming.