Chapter 2 Current Status of Iraq's Environment and Ongoing Reconstruction Initiatives

2.1 Iraq's Political Processes and Social Circumstances

2.1.1 Iraq's Political Processes

The domination of Iraq by a harsh one-party dictatorship began in 1968 when the Baath party took over the reins of government. After becoming the president of Iraq in 1979, Saddam Hussein involved the country in a period of almost constant war, starting in 1980 with the 8-year Iran–Iraq War, followed by Iraq's invasion of Kuwait in 1990, and the Gulf War of 1991. After its defeat at the hands of American and other troops of the multinational forces allied against it in the Gulf War, Iraq became isolated from both surrounding countries and the international community as a whole. The imposition of economic sanctions following Iraq's invasion of Kuwait had broad impacts on the inflow of vital commodities, and the populace suffered poverty as a result. It was against this backcloth that the USA and UK, fearful of the spread of weapons of mass destruction, invaded Iraq in March 2003, toppling Saddam Hussein's 24-year dictatorship in only 20 days.

After the fall of Saddam Hussein, Iraq was governed by the Coalition Provisional Authority (CPA) until authority was handed over to a transitional Iraqi government in June 2004. This was followed in January 2005 by the election of 275 representatives to the transitional Iraqi National Assembly, which then passed Iraq's new constitution in October 2005. A general election based on this constitution was held in December 2005, and a new parliament was elected, despite that fact that objections from various factions and parties caused confirmation of the election results to be delayed until February 2006.* According to the constitution, a president chosen by at least two-thirds of the parliament (184 representatives) is supposed to appoint the candidate proposed by the largest faction to the post of prime minister. However, negotiations between various parties have run into difficulties, with Ibrahim al-Jaafari, the former prime minister of the transitional government who was chosen by the Shiite faction, the largest faction, as its prime ministerial candidate, being rejected by Jalal Talabani, the former president of the same transitional government. The USA is also opposed to the appointment of al-Jaafari as prime minister. Rifts between political parties continue to create problems, with the parliament that gathered for its first session in March 2006 failing to agree on the selection of a speaker and the former foreign minister Adnan Pachachi, the eldest representative,

* Election results were as follows: Shiite faction 128 seats, Kurdistani Alliance 53 seats, Sunni faction (total for two factions) 55 seats, others 39 seats. Number of seats: 275. Term: 4 years

serving as provisional speaker. Moving forward, the parliament is to convene, and within 30 days select a president, who must within 15 days appoint a prime minister from the largest faction. The prime minister must then present his/her cabinet of ministers to the parliament within 30 days, and obtain its approval. A parliamentary committee for constitutional reform will deliberate on matters such as details of the federal system of government being demanded by the Shiite faction and the Kurds, with the resulting proposals being put first to parliament, and then to a national referendum.

Historically the Sunni faction, which accounts for no more than about 20% of the population of Iraq, has played a central role in the government of the region since the days of the Ottoman Empire. This trend continued even after the nation of Iraq was founded, with the Shiites and Kurds that make up the majority of the population being treated inequitably. As a result of the recent election, power has passed into the hands of non-Sunni factions, with the Shiites and Kurds gaining about 80% of the vote between them. As long as the government continues to be determined by election, non-Sunni factions look likely to retain power for a prolonged period, giving rise to concern about how the Sunnis who have ruled up to now will accept the current situation.

2.1.2 Social circumstances

Iraq became a middle-income country in the 1970s, with per capita income reaching $3600 by the beginning of the 1980s. Under the impact of economic sanctions, however, per capita income had declined to about $1000 by 2001, and has dropped even further since the Iraq War, as a result of which the populace has since 2003 come to depend on food rations. Iraq's education, public health and other government services, which once ranked among the highest level in the Middle East, have also declined to the lowest level in the region. Unemployment too is high, and much of the available employment being of an unstable, short-term nature.[2]

Public order in Iraq has shown no signs of improvement even by March 2006, 3 years after the conclusion of the Iraq War. Particularly as the political processes involved in creating the new government approached conclusion in late February 2006, the al-Askari Mosque (Sumarra, central Iraq), a sacred place to the Shiites, was blown up, sparking increasingly violent exchanges between Shiites and Sunnis throughout Iraq. With calls from Grand Ayatollah Ali al-Sistani, President Talabani and many other leaders for national reconciliation and a cessation of retaliatory attacks, the situation has improved somewhat, but is still very much in the balance, with a real danger of factional strife escalating into civil war. In the north, the Kurdish population that became the second largest parliamentary party is demanding

acceptance and expansion of autonomous rule, a move viewed with concern by Turkey and other neighboring countries harboring residents of Kurdish descent, because they fear the influence that such aspirations will have on their own Kurdish populations.

It is estimated that since the start of the Iraq War, over 30,000 Iraqi civilians at the very least have been killed or injured, and politicians and diplomats continue to be murdered. The US and British troops stationed in Iraq have also suffered a considerable number of deaths, and over 1600 injured, and are finding it difficult to replenish their ranks with new troops. Withdrawal of stationed troops depends on strengthening the capabilities of Iraqi military and police forces to a level at which they can maintain public order without the help of foreign forces. However, with many predicting that this will require several more years, and that armed conflict is likely to continue for over a decade, the future remains plagued with uncertainty.

Moreover, the goal of the insurgents is thought to be to spark a civil war, and it is doubtful that Iraqi military forces, even if strengthened, could function as a deterrent to civil war. It is thought that the loyalty of Iraqi troops lies not with the central government in Baghdad, but is rather split along factional or ethnic lines, with each unit pledging loyalty to the leaders of its respective affiliation—Shiite, Sunni, Kurd, and so forth. As such, there is serious concern that in the event of civil war, Iraqi forces would just disintegrate.

Insofar as it is the single biggest factor affecting Iraq's reconstruction, the situation as regards public order—currently still riddled with uncertainty and with chances of improving in the near future thought by most to be slim—needs to be watched with utmost care.

2.2 Iraq's Environmental Problems: Challenges and Assistance Needs

In the current situation with very limited possibilities for activities within Iraq itself, developing an accurate understanding of the current status of Iraq's environmental problems requires the piecing together and evaluation of fragmentary information from as many information sources as possible. The published reports and other documents of a wide array of agencies, interviews with Iraqi officials, press briefing records, and so forth were used as information sources.

The *Desk Study on the Environment* in Iraq issued by UNEP in 2003 is the single most comprehensive report on the current status of Iraq's environmental problems. The aim of this report was to speedily assess the overall situation with respect to Iraq's environment, and

identify the most pressing environmental issues faced by Iraq. The report provides an overview of Iraq, and explains the country's general environmental problems, and environmental impacts caused specifically by military activities. Following this Desk Study, UNEP conducted an on-site survey in July and August 2003, and issued a Progress Report in which it identifies reconstruction activities on which priority should be placed.

The UN and World Bank in 2003 issued the *UN/World Bank Iraq Needs Assessment*, a report that has been used by various countries and agencies involved in the provision of reconstruction assistance for Iraq as a basis for the consideration of assistance issues. It presents an assessment of the current situation in Iraq and its assistance needs in 14 sectors and 3 cross-cutting themes (Table 1).

Table 1: UN/World Bank Joint Iraq Needs Assessment—Scope of Report

Sectors	Cross-cutting themes
Education, Health, Employment creation, Water and sanitation, Transport and Telecommunications, Electricity, Housing and land management, Urban management, Agriculture, water resources, and food security, Financial sector, State-owned enterprises, Investment climate and trade, Mine action, Government institutions, rule of law, civil society, and media.	Human rights, Gender, Environment

Prior to these reports, UNEP in 2001 issued a technical report titled *The Mesopotamian Marshes: Demise of an Ecosystem* that used satellite images to warn the world of the fact that 90% of the southern marshland (Mesopotamian Marshes) had disappeared. In 2005 too, UNEP conducted an assessment of environmental hotspots.

Since the conclusion of the Iraq War, JICA too has conducted surveys on the rehabilitation of Iraq's infrastructure, and on human resource capacity building needs in the environmental field.

In addition, relevant personnel were interviewed to obtain details and the latest information on matters that were not fully covered in reports. Officials from Iraq's Ministry of Environment, Ministry of Water Resources, and other branches of the Iraqi government visiting Japan in August 2005 were interviewed to obtain information mostly on the southern marshlands. In September, a research team was dispatched to Italy to interview officials at Italy's Ministry of Land and Environment, and in March 2006, a meeting was held with Iraqi government officials visiting Japan on JICA training programs to exchange views. The Committee sought to obtain further information on Iraq's environmental problems in different environmental fields through using records of events such as meetings between donors of reconstruction assistance for Iraq, and press briefings held by Minister of the Environment Yuriko Koike and Nasreen Berwari Minister of Municipalities and Public Works in Iraq.

2.2.1 Iraq's Southern Marshlands

(1) Changes in Iraq's southern marshlands

It was in the marshlands in Iraq's southernmost region of Mesopotamia where, over 5000 years ago, the world's oldest urban civilization emerged. The same marshlands are said to be where the biblical Garden of Eden was located, and where the Great Flood, caused by 40 days and nights of unremitting rain, occurred. They also boast remains of the Sumer civilization, known for its invention of the wheel, and have since the first recorded history been inhabited by mankind in a sustained relationship with nature.

The Marsh Arabs revolted against the regime of Saddam Hussein after the Gulf War of 1991. As a measure designed also at rooting out rebellious elements using the marshes as a base, the government began to construct dikes and drainage channels with the goal of diverting water inflow and draining the marshes to develop them for agriculture, a project that led to the desiccation of over 90% of the marshes. It is said also that reed beds were burned and water intentionally poisoned.[3] It is estimated that over 500,000 Marsh Arabs were forced to find refuge in other parts of Iraq, or in Iran and other neighboring countries, and by January 2003, the marshes had been laid barren.

Before the Saddam Hussein regime drained them, Iraq's southern marshlands were once the greatest expanse of marshland in the western half of Eurasia and a valuable habitat for wildlife including a number of endangered species. The area has also served an important role as a stopover site for migrating birds, and as a constituent part of the Persian Gulf's fishing industry. The draining of the marshes has had a disastrous impact on the ecosystem, and endangered the survival of a number of indigenous species. These impacts moreover extend beyond the marshes to affect the Shatt al Arab waterway and Persian Gulf as a whole. The marshlands, for example, served as a spawning ground and nursery for marine life of the whole Persian Gulf, and with the dramatic decline in these capabilities as a result of draining, the Gulf's fishing industry has suffered severely.

Work began on destroying the dikes and reflooding almost as soon as the Iraq War ended in May 2003, and by May 2004, the efforts of the Iraqi Ministry of Water Resources and the local population had resulted in the reflooding of about 40% of the marshes.[4] However, because of the haphazard way in which this reflooding was carried out, rehabilitation of the marshes has been patchy, with some localities showing rapid restoration of vegetation, while others have been slower to recover, and still others showing no signs of recovery whatsoever. The repopulation of reflooded marshlands by the Marsh Arabs has also begun, and by May

2004, over 40,000 inhabitants had resettled the marshes to take up their traditional way of life once more as part of the marshland ecosystem.[3] However, this returnee population also faces many problems related to public hygiene and to quality of life owing to the loss of the fisheries and other elements on which they formerly based their livelihoods.

The Iraqi Ministry of Water Resources has made the rehabilitation of the marshlands one of its top priorities, and has established a Center for Restoration of the Iraqi Marshlands (CRIM), which works with donor countries, international agencies, NGOs, etc., and plays a central role in planning the sustainable rehabilitation of the marshlands.

(2) Marshland features and current status

Iraq's southern marshlands can be divided roughly into the following 3 marshes: Hawizeh Marsh located on the border with Iran, Hammar Marsh fed by the Euphrates, and Central Marsh, positioned between the Hawizeh and Hammar Marshes. Hawizeh Marsh, which is fed by the Tigris to the north, and Karkheh River to the east, has suffered relatively less drainage and desiccation than the other 2 marshes, but Iran is carrying out big dam works on the upper reaches of the Karkheh River on its side, and it is feared that inflow to Hawizeh Marsh will decline as a result. Central Marsh is fed from the north by a multitude of tributaries branching out from the Tigris, and according to surveys carried out to date, the ecosystem of Abu Zirig Marsh, located on the western edge of Central Marsh, has shown greatest recovery so far.[5]

Iraq's southern marshlands thus comprise a diversity of aquatic environments, with individual marshes and lakes differing in their natural conditions and the nature and extent of development and other human impacts. There are also areas in which the salinity is so great that it is hindering the recovery of vegetation. However, considering that even the water flowing into the marshes from the Euphrates, which is more saline than that of the Tigris, does not exceed the WHO-designated permissible salinity of 1000 mg/L for drinking water, it seems unlikely that the inflow from rivers is the cause of the high salinity of such areas. The probable explanation is that these particular marshes are virtually semi-closed water areas that, due to an imbalance between water inflow, outflow, and evaporation, do not allow sufficient water circulation and become highly saline as a result.[6]

(3) International watershed management

The fact that the upper reaches of rivers feeding into the Mesopotamian marshlands lie in other countries complicates the water issues of this region. The aquatic environment of Iraq's southern region is fed by rivers whose uppermost reaches lie in Turkey, middle reaches in Syria, and lower reaches in Iraq. Claiming upstream nation privileges, Turkey in the 1970s launched the Southeastern Anatolian Project (GAP) for dam construction on both the

Euphrates and Tigris rivers, and has since 1981 built 12 dams (out of a planned 22) on the 2 rivers. Syria has also dammed the Euphrates and some of its tributaries, and Iran too is exploiting water sources on its side of the marshes, significantly affecting the volume of water flowing into the Iraqi side.[7]

(4) Current circumstances of the daily lives of the Marsh Arabs

There were still apparently at least 250,000 Marsh Arab refugees who had not returned to their homeland by 2005. The Marsh Arabs' traditional occupation is fishing, and currently about 90% of returnees to reflooded areas are engaged in the fishing industry. Iraq's coast is very short, and the freshwater fishing industry of the marshlands once accounted for two-thirds of Iraq's annual catch, but that share is now thought to stand below 10%.[8]

Almost all Iraqis are eager for the marshes to be restored to their former state. However, according to an opinion poll carried out by USAID on the specific hopes of the populace,[9] there appears to be something of a generational gap in aspirations regarding life and work in the southern marshlands. The survey showed that people in their forties or older who were born and raised there are eager for the restoration of the marshes, while the under-25 generation that has been involved largely in agriculture (in short, the generation that has no experience of the former marshland life and traditional fishing industry) is keen to see further agricultural development. The generation in between these 2 groups would like to see the marshlands restored, but also harbors hopes for agriculture as a means for earning a livelihood.

Marshland returnees face the problem of a total absence of the infrastructure required to support everyday life—lack of safe drinking water, power supply, refuse collection and sewage treatment facilities, schools, clinics, and other public facilities.

2.2.2 Water Supply and Sanitation

(1) Waste management

Waste management services are implemented by metropolitan Baghdad and branches of the Ministry of Municipalities and Public Works. Up to the Iraq War, household refuse was collected by dustcarts in Baghdad and other major cities. Though quality declined after the Gulf War, this system was apparently still working relatively effectively up to the Iraq War. As for treatment, open dumping was the norm for urban domestic refuse; in rural areas where no collection systems existed, refuse was burned outdoors or dumped in the surrounding countryside. Currently no sanitary final treatment facilities exist in Iraq. With the Iraq War, the

urban refuse collection system ceased to function, and refuse came to be dumped on roadsides. Baghdad has since been equipped with dustcarts and containers for refuse collection through assistance from various donor countries, but such equipment has not yet reached other cities in sufficient quantity.[10]

The War and subsequent plundering and other destructive acts have also generated large amounts of construction and military waste. No progress has been made on the clearing up of destroyed and abandoned vehicles and vessels.

According to a 2001 survey, most hospitals in central Baghdad used to use incinerators to dispose of medical waste, but due to lack of funds, fuel, and parts during the Iraq War, these fell into disuse, and according to an on-site survey carried out by UNEP after the War, large amounts of medical waste remained uncollected and abandoned.[10]

(2) Water resources

The Tigris and Euphrates Rivers are the source of most of Iraq's water. Due to dam construction on the upper reaches of these rivers by Turkey and Syria, the amount of water flowing into Iraq has declined in recent years. Water quality too has apparently declined due to lack of deployment of sufficient water treatment facilities and malfunctioning of existing facilities.

There are 2 sources of groundwater used for drinking water: the mountainous region of northern Iraq and the right bank of the Euphrates River. However, there are fears that these sources have been compromised by water contaminated with petroleum, or by harmful substances released through military activities.[8]

(3) Water supply

Before the Gulf War, Iraq's water supply system employed what was at the time up-to-date technology and functioned efficiently. However, with the imposition of economic sanctions, the system declined considerably. It is estimated that in 2000 Baghdad still boasted 100% water supply coverage, with the national average for urban areas being 91%, and for rural areas, 48%. However, Iraq was unable to expand or update the system, resulting in extensive leaks throughout the network and a steady decline in the volume and quality of water supply. This, combined with the growth of urban populations has affected everyday life, with some areas receiving almost no water. Waterborne infectious diseases, which had been eradicated prior to sanctions, also spread again due to the impossibility of importing chlorine disinfectants. Particularly in the middle and southern regions, mortality has doubled over the past decade under the combined impact of disease and malnutrition.[11]

Agricultural infrastructure (particularly irrigation canal networks) has not been managed properly, and both public and private sector agricultural facilities in the middle and southern regions have suffered damage from war and plunder.

(4) Sewage treatment

Metropolitan Baghdad's sewer system covered 80% of the city, while the national average was 28%. Similarly, sewage treatment rate was 55% for metropolitan Baghdad, and under 20% in the governorates. Sewage from households not connected to sewers is disposed of on an individual basis, and outside metropolitan Baghdad, unsanitary disposal is not uncommon.[11] Moreover, according to a survey conducted immediately after the end of the Iraq War, there were no functional treatment facilities, and untreated sewage and sludge was allowed to flow freely into rivers, water channels, and unoccupied land, causing environmental and health problems. Baghdad's sewage, which accounts for 75% of Iraq's total sewage volume, flows into its only source of water, the Tigris River.[2]

2.2.3 Industrial Pollution Sites

Iraq's industry has suffered severe impacts from economic sanctions and lack of investment, causing chronic environmental problems such as the discharge of untreated wastewater from factories, leakage of chemicals into soil and groundwater, and release of harmful exhaust gas and particulate matter into the atmosphere.[10]

Many facilities that handled harmful or dangerous substances, including factories, mines, and weapons storage facilities also suffered war and other damage, and have been subsequently abandoned without the implementation of any appropriate environmental or health protection measures. UNEP has surveyed these sites, and has designated 1 site in northern Iraq and 4 in the environs of Baghdad as environmental hotspots. UNEP reported that all of these hotspots had suffered damage from plunder, fire, or war, and were all in such a poor state environmentally that none could be used.[12]

Table 2: Hotspots designated by UNEP

Hotspot	Outline
Al Qadissiya metal plating factory complex	Demolished after suffering successive bombardment and plundering. Harmful waste products including high-purity cyanide compounds scattered around premises that the public can enter freely.
Al Suwaira pesticide warehouses	Harmful pesticides whose use is now banned have been looted, and are scattered around the warehouse interiors, making them unsafe even to enter.
Khan Dhari petrochemicals	Refined chemicals have been looted and destroyed by fire. Broken drums and spilled chemicals litter most of the premises.

warehouse site	
Al Mishraq sulfur mining complex	A fire in 2003 caused local atmospheric pollution and crop damage. Currently abandoned.
Ouireej military scrap yard	Contains unexploded bombs and harmful chemicals resulting from collection and processing of metal scrap from the Iraq War and postwar demolition of weapons storehouses.

There may also be problems such as contamination by pollutants from the attack and destruction of large-scale chemical, explosives, and arms manufacturing facilities such as the Al Qa Qaa Complex, Al Qaim Superphosphate Fertilizer Plant, and Al-Tarik State Company, Fallujah II plant. This requires more detailed on-site information gathering.[10]

2.2.4 Other Environmental Problems

(1) Pollution caused by the petroleum industry

Iraq is blessed with plentiful oil resources, boasting the world's second largest reserves (but third according to some statistics). Iraq's oil fields are concentrated in the north and south, with the development of Kirkuk in the north starting in 1934, while Rumaila in the south was brought into full production in the late 1960s, and Majnoon, also in the south, was discovered in 1977 (see frontispiece 3). However, exploitation of those reserves has had major impacts on the environment, the development of the southern oil fields being a prime example, resulting in large-scale draining of the southern marshlands due to the lack of slant drilling* technology in Iraq in the 1970s. Oil extraction also carries the risk of spilled oil contaminating aquatic environments, and the burning of by-products such as natural gas generates NOx, Sox, and greenhouse gases.[13]

(2) Deforestation and desertification

Drought and the draining of the marshes have fueled land degradation and desertification. An extremely severe drought in 1999 caused serious damage to 46% of Iraq's farmland. It is thought that the passage of military vehicles over arid land has also damaged the fragile vegetation found there, resulting in increased wind erosion.

Owing to its climate, Iraq boasts large areas of very sparsely wooded land, and a comparison of figures taken from FAO reports of 1970 and 2000 suggests that the area covered by this sparse woodland has declined considerably. In the 1980s and 1990s, 80% of the date plantations that constituted one of Iraq's export industries were destroyed.[13]

*Slant Drilling: technology for boring at a slant from a certain point, enabling boring over a wide area from one location, and reducing the number of boring and pipeline locations.

(3) Other problems

The current circumstances of a serious shortfall of energy supply and frequent power cuts is forcing people to secure energy sources by economizing on food.* Policies for improving the power supply infrastructure and so forth will no doubt be implemented to resolve such problems, but those policies will need to employ sustainable technology.

2.2.5 Organizations for Environmental Management

(1) Organizations involved in environmental management prior to the Iraq War

The management and protection of the environment was not a priority of Iraq's previous government, but even so, compared with other Middle Eastern countries, it had a reasonably good system of environmental management and monitoring. In 1972 a Human Environment Directorate was established within the Ministry of Health, followed in 1986 by the enactment of an Environment Law and the establishment of an Environment Protection Center (EPC). In 1997, the Environment Law was revised to create the Environmental Protection and Improvement Law, and the EPC changed into the Environmental Protection and Improvement Directorate (EPID). Another revision of the law in 2001 split the EPID from the Ministry of Health to make it an independent agency charged with handling a broader range of environmental problems. At the same time, EPID branches were established in each of Iraq's 15 governorates, and the Environmental Protection and Improvement Council (EPIC), a body made up of experts and representatives of government agencies and the private sector, was also created.

EPID's responsibility was to provide advice on all environmental matters and carry out environmental research and monitoring, reporting its results and views to EPIC. The latter body reviewed EPID reports and took decisions on advisable actions and projects, issuing instructions to relevant ministries and agencies on required measures. EPID had a workforce of over 600, most of them engineers, doctors and other technicians, and operated with an independent budget. However, EPIC ceased to function in the administrative vacuum following the Iraq War in 2003, and EPID was re-integrated with the Ministry of Health.[10]

(2) Ministry of Environment

In September 2003, the Iraqi Governing Council announced a cabinet of ministers that included a Minister of Environment. A proposal for the organization of a new Ministry of

* From the record of a meeting on October 26, 2005, between Japan's Minister of the Environment Yuriko Koike and Nasreen Berwari, Iraq's Minister of Municipalities and Public Works

Environment was then drawn up and approved by the provisional parliament. EPID occupied the core of the new Ministry, which began operations under 2 under-secretaries, 1 each for the Technical and Administrative Units.[10]

The main tasks of Iraq's Ministry of Environment are the drafting and revision of legislation related to environmental matters, implementation of environmental monitoring and identification of pollution sites, monitoring of water quality, formulation of national strategies for environmental protection, solid and hazardous waste management, desertification countermeasures, rehabilitation of the southern marshes, and so forth. As of 2005, it was made up of the 15 directorates given below (Table 3).[14]

Table 3: List of Directorates of the Ministry of Environment, Iraq

Financial Directorate, Administrative Directorate, Legal Affairs Directorate, Environmental Monitoring and Inspection Directorate (assessment, monitoring), Air Pollution and Noise Directorate, Water Directorate, Biological Diversity Directorate, Land Use Directorate, Protection from Chemical Pollutants Directorate, Protection from Radiations Directorate, Department of Solid Waste Management (solid waste, hazardous waste), Environmental Information and Awareness Directorate, Information Technology Directorate (GIS, etc.), Planning and Continual Development Directorate (international cooperation, etc.), Central Labs (laboratory)

Iraq's Ministry of Environment operates several water source water quality monitoring stations, and has regional branches in Baghdad, Basra, Dhi Qar, and Maysan.

In addition to preparing drafts of environmental protection legislation, the Ministry of Environment has established Councils of Environment Protection in each governorate, and is conducting water quality surveys covering the whole of Iraq. It has also allocated a budget of 16.5 billion dinars (about 1.3 billion yen) for the rehabilitation (and protection) of the southern marshes, and has started to restore 6 large sewage treatment plants as a measure for reducing the inflow of untreated sewage into the Tigris and Euphrates Rivers.[15]

Regarding the southern marshlands, the Ministry is monitoring air, water, and soil in Hawizeh Marsh, and is conducting on-site surveys of the Abu Zirig and Kurmashia Marshes. It is also a member of the CRIM Steering Committee.

The UNEP Progress Report of 2003 raised the point that the offices allocated to the new Ministry of Environment are cramped, and that this was having an adverse effect on the Ministry's work. The Baghdad laboratory had been looted, and the equipment of regional labs was outdated and necessary reagents in short supply. The report pointed to the need for strengthening the technical capacity of the Ministry through staff training, the drafting of rules and standards, and the provision of relevant equipment (both field and lab), buildings, computers, vehicles, funds, and so forth.[10] On the administrative side, there is also a need for

stronger environmental governance, improvement of environmental assessment capabilities, measures for the most polluted locations, the raising of public awareness, and the creation of environmental infrastructure through laws and regulations.[14]

(3) Ministry of Water Resources

Iraq's Ministry of Water Resources, which was established in 1969,* is responsible for handling all of Iraq's water issues and managing all surface water and groundwater. Key areas of responsibility include storage dam construction, flood control, water supply (agricultural water, drinking water, water for power generation and industry, environmental improvement, etc.), construction and management of irrigation facilities, and groundwater resources management. It is divided into the following directorates: Finance and Administrative Affairs (handling legal affairs, finance, evaluation, etc.), Planning and Engineering Designs (handling planning and research), Companies Affairs (handling irrigation throughout Iraq), and Construction and Maintenance (handling dam, reservoir and water resource development projects). The Ministry of Water Resources also established CRIM in 2003 to prioritize the rehabilitation of the southern marshes. CRIM coordinates domestic and international efforts to rehabilitate the marshlands, and reports directly to the Council of Ministers.[16]

In addition to irrigation and development projects, the dredging of waterways, dam construction and expansion of irrigation infrastructure in western Iraq, the Ministry of Water Resources is also endeavoring to boost skills through dispatching 381 of its personnel to 21 countries including Japan for training. The Ministry's budget for 2004 was $150 million (about 17 billion yen). Its activities in southern Iraq include the implementation of a drinking water project in Basra.[16,17]

(4) Ministry of Municipalities and Public Works

Iraq's Ministry of Municipalities exercises jurisdiction over all cities except Baghdad and the Kurdistan Autonomous Region, being responsible for water supply, sewage treatment, and local administration. It is currently working with the UN and other assistance agencies to re-launch public services and rehabilitate drinking water supply and sewage treatment facilities. Due to damage inflicted on water supply-related facilities by terror attacks, and general aging of water supply pipeline networks, only 14% of the population are served by the water supply system. Unlike water supply, the sewer system has not attracted much assistance from donors. Waste treatment equipment imported in the 1990s is low-level, and assistance in the form of vehicles and equipment is required.

* The precursor of the Ministry of Water Resources was the Ministry of Irrigation, established in 1918.

In the southern marshlands, work is proceeding on water supply, sewer systems, road networks and other infrastructure, but inhabitants are not returning in a planned fashion. Assistance for water supply, sewerage, and electric power (solar power generation, etc.) is needed.[18]

(5) Ministry of Planning

Iraq's Ministry of Planning is considering the establishment of a special agency for handling the rehabilitation of the southern marshlands. It also aims to further strengthen ties with Iraq's universities, research institutes, and other ministries and agencies, and make progress on negotiations with Iran, Turkey and other neighboring countries on water resource issues. The research institute that the Ministry of Planning is planning to establish will conduct research into vegetation, water, fish, birdlife and other aspects of the southern marshlands, designate special protection areas within the marshes, launch initiatives to boost the skills of technicians and other workers, and so forth.[19]

(6) Ministry of Agriculture

Iraq's Ministry of Agriculture has jurisdiction over farmland ownership, farmers, farmer unions, contracts with agro-businesses, and so forth. It has particular responsibility for supplying farmers with resources, and marketing their produce.[13]

For the southern marshlands, the Ministry of Agriculture has established a Marsh Rehabilitation Committee, which is deliberating on the following 5 plans: (1) development and protection of marshland fish resources; (2) improvement of technologies, including the raising of water buffalos; (3) increased rice production through the use of genetic technology; (4) education and skills training for farmers, women, and senior citizens; and (5) improvement of farmer skills, milk factories, feed factories, etc. Areas of specialist training for which the Ministry is seeking training providers include water buffalo rearing, rice cultivation, agricultural instruction, and fishing industry resource management.[18]

(7) Coordination mechanisms

Under Iraq's prewar administrative organization, almost all of its ministries—including Health, Irrigation, Agriculture, Industry and Mineral, Oil, Foreign Affairs, Education, Higher Education, Science and Technology, Planning—boasted an environmental section, and the heads of directorates within each ministry attended EPIC meetings. The environmental sections of the ministries were retained as they were, and now coordinate their activities with the new Ministry of Environment. At the regional level, each governorate has a Council of Environment Protection that works with the respective governorate's Health and Agriculture Directorates.

Representatives of ministries and agencies meet under the auspices of CRIM to discuss and implement policy related to rehabilitation of the southern marshlands, but each ministry or agency has also established its own section for implementing marshland-related policy. A proposal for the establishment of a dedicated Marshland Rehabilitation Ministry (or Agency) has been floated, but not acted upon.[19]

(8) Environmental initiatives of research organizations and NGOs, etc.

The University of Basra is conducting research into water and aquatic organisms, and is working with the Iraq Foundation (IF), an NGO, to survey the recovery status of ecosystems following reflooding of the southern marshlands. With funding from USAID, the university has also established a laboratory for water quality and soil analysis, and is raising juvenile fish in a fish farm within the marshlands. At the University of Baghdad, the Environmental Engineering and Biochemistry faculties are conducting sample and ecosystem surveys. The University of Mosul conducts research in arid zone agricultural production and arid land management.[13]

The IF is an NGO working for the establishment of democratic institutions and human rights in Iraq. In addition to running constitution assistance projects and human rights education projects, it is working with other NGOs and donor countries to implement the Eden Again Project for rehabilitation of the southern marshlands.[19] The University of Basra is working with the IF to survey the recovery status of ecosystems following reflooding of the marshlands. NGOs working with the IF on the Eden Again Project include Nature Iraq and the Arab Marshlands Forum. Assisting Marsh Arabs and Refugees (AMAR), an NGO providing the Marsh Arabs with humanitarian assistance, has been active in the southern marshlands since 1991, and has since 2003 been supporting the return of Marsh Arab refugees, and promoting healthcare, water, and sanitation projects.

2.3 Japanese Reconstruction Assistance for Iraq in the Environmental Field

2.3.1 Ongoing Japanese Assistance

At a meeting of countries wanting to help in the reconstruction of Iraq held in Madrid, Spain in October 2003, after the conclusion of the Iraq War, Japan offered an initial $1.5 billion in grant aid, with priority for its use to be put on the improvement of public order and reconstruction of the infrastructure supporting the everyday lives of the Iraqi people, including electric power, education, water supply and sanitation, healthcare, and employment. The specific uses to which all of these funds were to be put was decided by the end of 2005, the

breakdown being approximately $900 million in direct aid to Iraq, $120 million in UN-mediated aid, $490 million in donations to funds for the reconstruction of Iraq, $26 million in NGO-mediated aid, and $10 million for training programs. Japan is also making personnel contributions in the form of specialists dispatched to the UN/World Bank Joint Iraq Needs Assessment.

The Government of Japan will provide up to $3.5 billion mainly through concessionary loans (yen loans) to meet the mid-term reconstruction needs. So far, the Government of Japan announced its intention in March 2006 to provide up to 76,489 million yen at total (approximately $650 million) for the implementation of “Port Sector Development Project”, “Irrigation Sector Loan Program” and “Al-Mussaib Thermal Power Plant Rehabilitation Project”.

JICA is conducting research for both grant- and loan-based assistance to be provided by Japan, and is carrying out projects aimed at improving the administrative functions of the Iraqi government. It provided training in Japan for 2 Iraqi government employees in FY2003, 128 in 2004, and 166 in FY2005, and third-country training (in Egypt, Jordan, Syria, and Malaysia) for 100 in FY2003, 506 in FY2004, and 402 in FY2005. The fields covered by these training programs were medicine, electronics, statistics, water, water supply and sewerage systems, culture, education, roads and bridges, agriculture, and environment (waste management, etc.). JICA’s research for grant aid was directed at the drafting of emergency grants for electric power, water and sanitation, healthcare, education and other projects, while for loan-based assistance, it conducted research for the drafting of mid- to long-term infrastructure support programs. It is also providing follow-up cooperation aimed at utilizing the 1000-plus former trainees who have returned to Iraq.[20]

2.3.2 Plans and Achievements in the Environmental Field

(1) Training programs

In March 2006, JICA brought 13 trainees to Japan to participate in a group training program on the restoration of marshlands in Southern Iraq. Japan has also held third-country training programs in Jordan in areas such as waste management and in water supply, sewerage, and water quality analysis, and has recruited Iraqi trainees for existing group training programs in Japan. In 2004, to plan training programs in the environmental field, JICA also researched capacity building needs, and proposed implementation of the following 8 types of training program: “Environmental Assessment and Environmental Impact Assessment (EIA)”, “Environmental Research, Statistics and Study Approaches”, “Environmental Monitoring”,

“Management of Protected Areas”, “Conservation Biology”, “Environmental Awareness”, “Environmental Laws, Legislations, Regulations and Agreements”, and “Solid Waste Management: Legislative and Technical Aspects”.[14]

With funding from the International Reconstruction Fund Facility for Iraq, to which Japan is a donor, UNEP’s International Environmental Technology Centre (IETC) has also held training related to marshland environmental management in Japan and neighboring Arab countries. UNEP’s Post Conflict Assessment Unit (PCAU) too has helped to nurture human resources in the environmental field in Iraq by providing Iraqi Ministry of Environment personnel with training in areas such as environmental legislation, environmental administration, and environmental monitoring technology.

(2) Grant aid (provision of equipment, etc.)

In the water and sanitation fields, Japan has provided equipment such as prefabricated water purification plants, dustcarts, bulldozers for refuse landfill sites, vacuum trucks, and refuse containers. In the city of Samawa where the Japan Self-Defense Force personnel are based, Japan has provided 300 refuse containers, 12 dustcarts, and has funded the boring of water wells in 4 locations 200 km south of Samawa that lack a source of water. At the grassroots level, it has also provided water purifiers and helped to repair sewers, etc.

(3) Donations to international organizations

Through donations to the UN’s International Reconstruction Fund Facility for Iraq, Japan has helped to fund UNEP’s Southern Marshland Environmental Management Assistance Project and environmental training programs for Iraqi government personnel.

Japan has also donated funds to UNDP aimed at generating jobs for the local population through employing them for such work as repair of water supply systems, refuse collection, and cleanup projects.

(4) NGO-mediated assistance

Japan has provided assistance for sanitation improvement measures through funding NGOs under the Japan Platform to carry out emergency repairs on elementary school toilets and water supply pipelines and sewers in Baghdad.

(5) Preliminary study for the arrangement of emergency grant-based assistance

JICA has interviewed informed sources both within Iraq and elsewhere and otherwise gathered information to ascertain immediate emergency reconstruction demands and arrange corresponding assistance, and has issued its findings. Water and sanitation were among the areas investigated, and JICA interviewed personnel belonging to organizations such as Iraq’s

Ministry of Water Resources, metropolitan Baghdad, UNDP, and USAID. The following is a short list of emergency assistance targets relating to water and sanitation drawn up by JICA.[11]

Table 4: Water and sanitation assistance needs identified in a preliminary study of Iraq's reconstruction assistance needs

Item	Outline
Baghdad water purification equipment installation plan	Installation of 10 prefabricated water purification units within the city (compact units handling 4500 m^3/day)
Southern 4 governorates water purification and reverse osmosis (RO) equipment installation plan	Replacement of 35 prefabricated water purification units (compact units), and installation of 24 new reverse osmosis desalination units
Baghdad sewer pump renovation plan	Replacement of pumps, motors, valves, screens, panels, cables, etc.
Karkh Sewage Treatment Plant (Baghdad) expansion plan	Emergency construction of 200,000 t/day treatment facility to handle sewage currently being released into the Tigris River
Saba Nissan Water Purification Plant existing intake pumping station renovation plan	Repair of existing pumping station (42 m^3/min, 185 kW × 14 pumps)

(6) Basic study for reconstruction and rehabilitation of infrastructure

With the basic aim of ensuring a smooth transition from grant aid-based restoration and reconstruction assistance to more mid- to long-term development assistance, JICA has gathered and analyzed information for the formulation of infrastructure restoration and development assistance programs using Japanese ODA.

The sectors investigated are roads and bridges, railways, airports and harbors, telecommunications, water resources, electric power and energy, food and agriculture, health and medicine, education and job training. JICA has drafted a project long list[21] that takes account of the results of local inhabitant opinion polls and coordination with other donors, and will serve as a basis for reconstruction and development programs in each of these sectors.

2.4 Donor Environmental Aid and Frameworks for Coordination of Aid

2.4.1 Frameworks for International Coordination

(1) Donor meetings for the reconstruction of Iraq

The Madrid Conference on Reconstruction in Iraq held in October 2003 was attended by 73 countries and 20 international organizations and served as a forum for the discussion of the roles that each country could play in the 14 areas identified by the joint UN/World Bank Needs

Assessment survey. At this meeting, the establishment of the International Reconstruction Fund Facility for Iraq was decided, with a total of over $32 billion in assistance being pledged by the participating countries.[22]

Following the Madrid meeting, Iraq Reconstruction Fund Donors Meetings have been held in Abu Dhabi in February 2004, Doha in May 2004, and Tokyo in October 2004. At these meetings, donor countries reiterated their commitment to Iraq's reconstruction, and at the Tokyo meeting, Iraq's transitional government presented an integrated reconstruction strategy, and Iran and other countries joined the list of donors. The importance of elections was also reconfirmed, with various countries vowing their assistance for holding elections. At this point in time, donor countries had pledged the following sums: The USA $20.3 billion over 18 months from 2004; Japan $5 billion over 4 years from 2004; UK $930 million; EU member countries $825 million over 2 years from 2004, with an additional $860 million to be provided in humanitarian aid; Saudi Arabia $1 billion; Kuwait $500 million; Iran $300 million; Italy $235 million; United Arab Emirates $250 million; World Bank $3–5 billion over 5 years; and IMF $2.5–4.25 billion over 4 years from 2004

(2) Donor meetings for coordination of environmental assistance

With the aim of sharing information on Iraq's environmental problems among interested parties, and setting priorities, UNEP has since March 2003 held roundtable conferences in Geneva.[10]

With regard to the rehabilitation of the southern marshlands, meetings to coordinate the efforts of donor countries have been held since May 2003.[23] After the conclusion of the Iraq War, CRIM was established in the Iraqi Ministry of Water Resources as a local organ for coordination between the various parties involved, and a master plan for the rehabilitation of the marshes prepared. As shown in the diagram below, the 3 pillars of this master plan, which organizes the projects that donor countries and organizations had implemented of their own accord up to the October 2004 donor meeting, are (1) water, (2) ecosystem, and (3) society and economy. The master plan is aimed at coordinating efforts to rehabilitate the marshes through cooperation between donors and agencies in Iraq, so as to avoid duplication of efforts by donors and to clarify the assistance required in the future.

IRAQI COUNCIL OF MINISTERS

IRAQ MoWR - CRIM; MoE; MoMPW; MoC; Others	Project Advisory Committee	DONORS UNEP, WB, UK, USA, Japan, Italy, Canada, Others

LIAISON OFFICER – UNEP

Task and Task Management Group	Water		Ecology		Socio-economy		
	Marsh land hydraulics	Water asset	Human impact management	Ecosystem management	Land planning	Infrastructure and services (agro, health, education, tourism, etc.)	Culture and anthropology
Activity	MoWR, IMET, USAID, Others	MMPW, IMET, USAID, UNEP, Others	MoE, UNEP, Others	MoE, CIDA, World Bank, Others	MMPW, Others	MMPW, USAID, UN Cluster, Others	MoC, Others
Data collection and survey							
Monitoring							
Modeling/ analysis							
↓							

Figure 1: Master plan for the rehabilitation of Iraq's southern marshes

2.4.2 Overview of Environmental Projects of International Organizations and Donor Countries

Table 5 below lists the areas of assistance activities and main projects being implemented on January 2006 by respective countries and organizations for the reconstruction of Iraq.

Table 5: Reconstruction assistance projects being implemented by respective countries and organizations

Country, organization	Activity areas	Main projects
UNAMI[24]	• Agriculture, food safety, environment, resource management • Education, culture • Governance, human resource development • Health and nutrition • Rehabilitation of infrastructure • Refugees, internal refugees	Various agencies of the UN (UNDG) are implementing a wide range of projects.[25] Those of an environmental nature are: • Strengthening of environmental governance (UNEP) • Assistance for use of environmentally sound technology (EST) in the marshes (UNEP) • Capacity building of agencies involved in water issues (UNESCO) • Rehabilitation of water supply and public hygiene systems in southern Iraq (UNICEF) • Water quality control and monitoring (WHO) UNDP's Web site also lists the following projects: • Measures against Shatt al Arab drainage (prospective) • Emergency drinking water supply in Baghdad • Rehabilitation of Baghdad's sewage treatment systems
World Bank[26]	• Rehabilitation of community infrastructure • Urban water supply and public hygiene • Baghdad water supply	
League of Arab States[27]	• Pledged $2.8 billion at donor meeting (in addition to which Saudi Arabia has also pledged $1 billion, Kuwait $500 million, and Iran $300 million).	
USA* USAID[28]	• Agriculture	• Food security (wheat) • Development of private sector (agricultural equipment repair and maintenance capabilities) • Poverty reduction (introduction of high-value crops, improved livestock rearing, etc.) • Irrigation (integrated soil, water and crop management, assistance for the drafting of a national water strategy)
	• Water supply and public hygiene	• Rehabilitation of sewage treatment plants (Baghdad and southern cities, etc.) • Construction of water purification plants, and repair and improvement of waterways (Baghdad, Basra, Najaf, etc.)

The following table lists the goals, activity details and locations of projects being carried out by respective countries and organizations specifically in Iraq's southern marshlands.

* According to its Web site, USAID is providing assistance to various Iraqi government agencies for the drafting of a national water strategy that covers water allocation management, water storage capacity management, dam management, and flood control.

Table 6: Southern marshland rehabilitation projects implemented by respective donors

Project name		Iraq Marshlands Restoration Program[29]	Eden Again[30]	New Eden[30]	CIMI (Canada Iraq Marshlands Initiative)[31]	UNEP Marshlands Management Project
Donor agency		USAID	US State Department	IMET	CIDA	Japan (provision of funds)
Contracted agency		Private sector consultants (DAI)	IF	Private sector consultants (SGI)	Waterloo University	UNEP/IETC, UNEP/PCAU
Project period		October 2003 – September 2005	2002 - 2003	From 2003	From May 2004	August 2004 – March 2006
Partner agencies	**Within Iraq**	Iraqi Ministries: Water Resources, Agriculture, Environment Governorates: Maysan, Nasiriyah, Basra University of Basra Marine Science Center (MSC), IF, AMAR	Ministry of Water Resources, CRIM, Ministry of Environment, NGOs (AMAR, IF, Nature Iraq)		Ministry of Environment, Ministry of Water Resources, CRIM, etc. Marshlands University Consortium, IF, Nature Iraq, Iraq Nature Conservation Society	Researchers from Ministries of Environment, Water Resources, Municipalities and Public Works, Science and Technology, the 3 southern governorates, and educational institutions
	Others	Advisors from other agencies (Iraq, USA, UK, Jordan, Australia, Czech Republic	UNEP, USAID, USACE, USEPA, IOM, WHO, etc.		Birdlife International offices in UK and Jordan, etc.	

(1) Overview of US marshland-related assistance

The US Agency for International Development (USAID) has provided assistance focused on the socioeconomic aspects of marshland rehabilitation through the implementation of its Iraq Marshlands Restoration Program (IMRP) with a budget of $4 million. The program lasted from October 2003 to September 2005. Under IMRP, USAID provided the following national level assistance: (1) development of a hydrological model for the Tigris and Euphrates watersheds (undertaken by the US Army Corps of Engineering—USACE); (2) water quality and soil lab provisioning; (3) implementation of overseas training tours and drafting of training courses; and (4) assistance for the drafting of CRIM strategy, etc. Local marshland level IMRP activities included: (1) drafting of an integrated marshland management plan; (2) assistance for agricultural production and related businesses; (3) livestock and dairy industry rehabilitation; (4) assistance for fishing industry and fish farms; (5) expansion of primary healthcare; and (6)

community-level artificial marsh design. These activities are thought to be bringing benefits both by improving the capabilities of the Iraqi government and by improving income, work opportunities, and living standards of over 500,000 Marsh Arabs.

The October 2004 working session held in Amman, Jordan, was one of the most noteworthy national-level IMRP activities. This working session looked into the quality of data and improvement of field research for the benefit of field research teams from the University of Basra and the Iraq Foundation (IF), and representatives of the Ministries of Water Resources and Environment. It also provided field training in the use of monitoring equipment on nearby rivers, and looked at the analysis processes used by Water Authority Jordan.

One of the notable marshland-level assistance activities was monitoring carried out in Hawizeh and Hammar Marshes from March 2004. A database was also created, and the final report regarding this monitoring is due to be submitted to the Iraqi government shortly.

Following the completion of IMRP in September 2005, the majority of the activities carried out under it were taken over by the Agriculture Reconstruction and Development Program for Iraq (ARDI) which has been running since October 2003 with a budget of $7.2 million. Continued marshland monitoring and the construction of artificial marshes (slated to start in 2006) are among the inherited activities. Evaluation of the increased load on the environment from agricultural development is also likely to be carried out under future programs.[32]

(2) Overview of Italian marshland-related assistance

Italy's Ministry for the Environment and Territory (IMET) is providing assistance for marshland rehabilitation focused on water issues, including an Abu Zirig marsh rehabilitation project, feasibility studies related to water and energy, and help in drafting master plan for the rehabilitation of Iraq's southern marshlands. The Abu Zirig project involves monitoring to gather data, develop hydraulic models, and draft and test rehabilitation scenarios, while the water and energy feasibility studies are concerned with the consideration of desalination projects that make use of natural gas currently released into the atmosphere as flare gas in the southern oilfields. The data obtained from these activities is being entered into a GIS database to be used in simulations. Italy is also providing assistance in the area of public hygiene by surveying the current status of water supply and sewerage facilities. Moving forward, Italy plans to focus on the Green Village concept based on CRIM proposals.[33]

The Green Village concept proposes the creation of the following 3 types of village communities that incorporate the wishes of all of the returnees to the marshes: (1) villages whose life is based on the fishing industries of islands within the marshes; (2) villages that incorporate agriculture; and (3) villages with road access that incorporate modern lifestyles.

This concept is based on the prevalence among the generation that grew up to depend on agriculture after the draining of the marshes of a desire to continue to lead a farming-based life, and on the time required for that generation to acquire the knowledge and skills of the fishing industry. The Green Village concept also includes a proposal to retrieve and supply the aforementioned flare gas to village households. IMET will first carry out a pilot Green Village project in the Abu Sabat area on the banks of the Euphrates River, expanding the project in time to encompass about 50 locations.[34]

(3) Overview of Canadian marshland-related assistance

Canada's marshland rehabilitation assistance is focused in particular on ecosystem rehabilitation. In specific terms, Canada is providing assistance in the following 3 fields: (1) surveying and reporting on key biodiversity areas (monitoring of the ecosystem of Abu Zirig Marsh; (2) assistance for training and improvement of organizational capabilities; and (3) assistance for international initiatives (assistance for Ramsar Convention designation/registration, and promotion of dialog between Iraq and Iran on marshlands. Canada aims to extend its current activities to eventually cover the whole of Iraq.[34]

(4) Overview of UNEP's marshland-related assistance

With support from the International Reconstruction Fund Facility for Iraq, UNEP is providing assistance aimed at rehabilitating the southern marshland environment and providing the people inhabiting the marshes and surrounding areas with clean water and sanitation. If all the people who left this area return, their population is predicted to reach 500,000. Based on this estimate, UNEP is providing assistance in the form of pilot projects for the provision of 6 water and sanitation facilities that employ environmentally sound technology (EST), and various other components.[24]

This project was launched in 2004 by UNEP's International Environment Technology Center (IETC) with a budget of $11 million, and was made up of the 5 components given in the table below. The training courses included in this project were provided in Japan and countries near Iraq. Those in Japan were a program on water quality control organized with the help of the International Lake Environment Committee (ILEC), a program on sustainable sanitation and sewage treatment systems organized with the help of the Global Environment Centre Foundation (GEC), and a program on EST for drinking water supply. Trainees were also provided with secondary training at Iraqi educational facilities and government agencies on returning to Iraq.

UNEP is planning to use a new budget allocation from 2006 to implement initiatives to maintain pilot projects for provision of materials for the extension and enlargement of water supply pipelines, and to prepare new materials for raising awareness of environmental issues.

Table 7: UNEP southern marshland project

Component	Outline
Formulation of strategy and support for coordination	Holding of roundtable meetings on the southern marshlands, coordination of donor country marshland rehabilitation projects, maintenance of dialog and exchange of information with responsible Iraqi government officials, Iraq-based coordinators, and local community leaders, etc.
Basic data collection and analysis	Development of the Marshland Information Network, and its operation in both English and Arabic, collection and analysis of basic data including water quality data obtained through on-site testing, and remote sensing analysis
Capacity building	Capacity building through marshland management and EST deployment training using a “train the trainers” approach, and support for secondary training in Iraq
Implementation of pilot projects	Implementation of pilot projects that apply EST to deliver safe drinking water, sanitation, and water quality control to 6 marshland communities, and support for community-level projects
Raising awareness and follow-up activities	Holding of international open conferences, issue of pamphlets and periodicals, publicity activities, etc.