United Nations Assistance Mission for Iraq
United Nations Country Team in Iraq

Water Resource Management White Paper

June 2010

Introduction

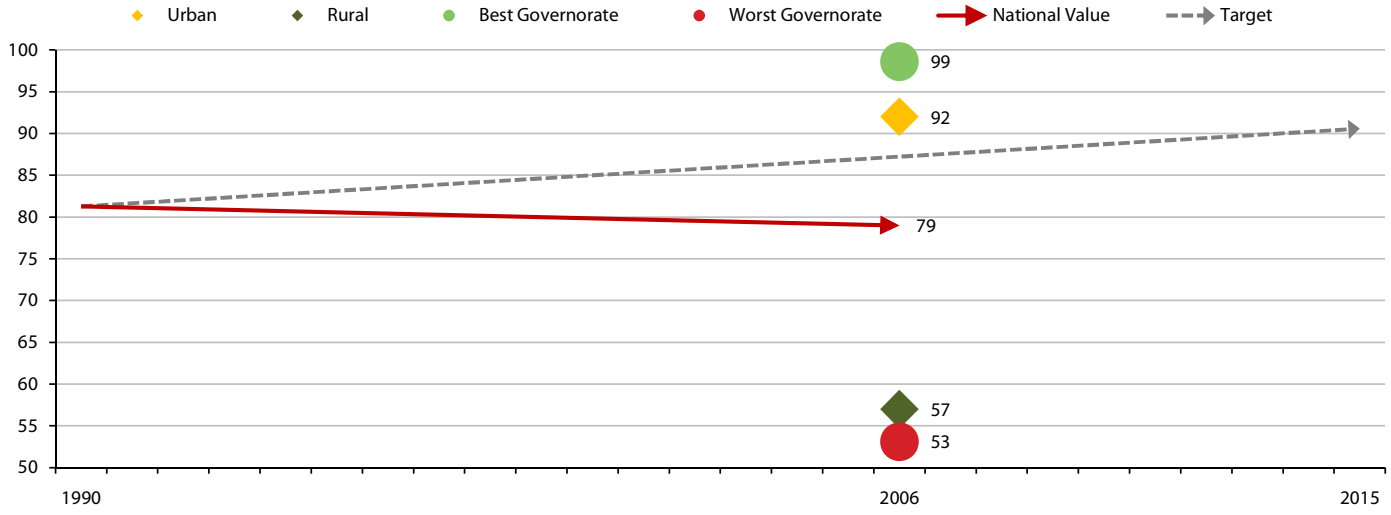
Progress in the field of water resource management will support a myriad of Iraq's development priorities, and has the potential to contribute to the consolidation of peace and stability along two primary axes: firstly, through its enhancement of the welfare of the people of Iraq, including environmental and health considerations; and secondly, through its contribution to a diversified and dynamic national economy. By the same token, continued degradation of Iraq's water management could have disastrous consequences for the lives and livelihoods of the population.[1]

Three decades of war, armed conflict, sanctions and neglect for infrastructure – combined with limited environmental awareness – have undermined Iraq's entire water resource management system. Furthermore, interventions by Iraq's upstream neighbours will continue to cause a considerable reduction in water flows into Iraq. At the household level, a lack of or dilapidated infrastructure, low water quantity, and poor water quality mean that a fifth of the population is still using an unimproved source of drinking water.[2] Inadequate disaster preparedness – exacerbated by poor agricultural infrastructure and practices – also renders rural areas more vulnerable to drought conditions similar to those witnessed since 2007. As a result of the drought, people and livestock in rural areas have been deprived of safe drinking water, and 39 per cent of cropland suffered a drop in vegetation coverage for two consecutive years between 2007 and 2009.[3] The "fertile crescent" will continue to be directly affected by lower levels of rainfall, and may even disappear altogether.[4]

The efforts of the Government of Iraq (GoI) to improve water resource management have been hampered by the over-sized and low technical capacity of the civil service, lack of accountability and transparency, lack of coordination between relevant ministries, lack of clarity over roles and responsibilities between central and regional governmental actors, the divorcing of financing and planning, and the insecure investment environment.[5] Iraqi industry, agriculture and civil society as a whole are equally ill-equipped to improve the way in which they utilize dwindling resources, due to low awareness levels, lack of investment funds and lack of regulation and incentives provided by the Government.

The United Nations is uniquely positioned to support Iraq to better manage its water resources. The stamp of international legitimacy offered through the UN has a direct bearing on providing a high-level platform for development. The UN's impartial role is widely accepted amongst key stakeholders across Iraq's governance structures. This confers on the UN a unique relevance to and responsibility around specific efforts led by

Figure 1 - Proportion of population using an improved source of drinking water (per cent)



1 UN Iraq Country Team, Common Country Assessment: Iraq (2009)
2 UNICEF/COSIT/KRSO/Ministry of Health Multiple Indicator Cluster Survey (2006)
3 FAO/IAU, Drought Mapping Analysis (2009); OCHA, Drought Report (2009)
4 UN Iraq Country Team, Common Country Assessment: Iraq (2009); Geopolicity, Managing the Tigris-Euphrates Watershed: The Challenge Facing Iraq (Draft, 2010)
5 Ibid.

the GoI to establish national policy frameworks for national services development in line with the National Development Plan (NDP). The UN is well placed to use its technical comparative advantages to focus on a "knowledge-centric" water resource management assistance programme. In addition, the UN, bringing low resources but high technical capacity to Iraq's development agenda, is better placed than other international partners to set a standard for co-financing from the GoI at the national and local levels of programme implementation. This is critical to ensure that the Government's leadership is maintained and that Iraq moves towards self-sufficiency in this field.[6]

The UN's dedication to upholding human rights, ongoing efforts to reduce poverty, and commitment to support Iraq's sustainable development have contributed to the development of this white paper. Through the integration of the development expertise within the United Nations Country Team (UNCT) for Iraq and the political expertise within the United Nations Assistance Mission for Iraq (UNAMI), this paper seeks to outline the steps the UN can take to facilitate the optimization of Iraq's management of its water resources.

Approach

This white paper and subsequent interventions will maintain a continued focus on two central themes: the Millennium Development Goals (MDGs) and knowledge development.

Millennium Development Goals

Iraq's water resource management will play a prominent role in contributing to the country's efforts to eradicate poverty and hunger (MDG One), reduce child mortality (MDG Four) and ensure environmental sustainability (MDG Seven). Progress towards specific targets within these goals has stagnated in some cases, but improvements in other areas have been significant.

Access to safe drinking water obtained from a sustainable source is a specific target under MDG Seven. One fifth of households still obtain drinking water from an unimproved source[7] – around the same as in 1990 (19 per cent).[8] In rural areas this percentage increases to 43 per cent.[9] Iraq aims to ensure that 91 per cent of households use an improved drinking water source by 2015 (see *Figure 1*). Additionally, the quality of the water provided through the public network and other improved sources continues to be a cause for concern.[10] 52 per cent of those using an improved drinking water source report problems with the supply.[11]

Poor water infrastructure and inefficient usage, exacerbated by environmental hazards, are impacting livelihoods and food security across the country. 39 per cent of the rural population lives below the poverty line, 23 per cent of the entire population (see Figure 2).[12]

Iraq's efforts to improve food consumption have been severely hindered over the past 20 years, with around one fifth of the population – the same as in 1990 – still living on less than the daily recommended energy intake.[13] Iraq is aiming to reduce poverty to 16 per cent and insufficient food consumption to 1 per cent by 2015 (see *Figure 3*). Improved water resource management will be instrumental in contributing to the country's progress towards these targets under MDG One. Advances in rural access to water fit for drinking and agriculture will also slow the prevailing trend of rural-urban migration, mitigating the increasing demand for water in urban areas and reducing the number of urban slum dwellers (MDG Seven). Iraq is seeking to

6 UN Iraq Country Team, Common Country Assessment: Iraq (2009)

7 "Unimproved" sources of drinking water include: surface water, carts with a tank or drum, tanker trucks, unprotected springs, unprotected wells and bottled water. "Improved" sources include: piping into dwelling, piping into a yard or plot, tube-wells, bore holes, protected wells, protected springs, rainwater and bottled water. (The classification of bottled water as an "improved" or "unimproved" source is conducted on a case-by-case basis depending on the household's water source for cooking and cleaning. UNICEF/COSIT/KRSO/Ministry of Health, Multiple Indicator Cluster Survey (2006). "Improved" water sources are deemed more likely to protect users from external contaminants, but direct measurements of water quality are not included in this indicator. For more information see:

(http://unstats.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=665, extracted 20 May 2010).

8 COSIT MDG Report 2007

9 UNICEF/COSIT/KRSO/Ministry of Health, Multiple Indicator Cluster Survey (2006).

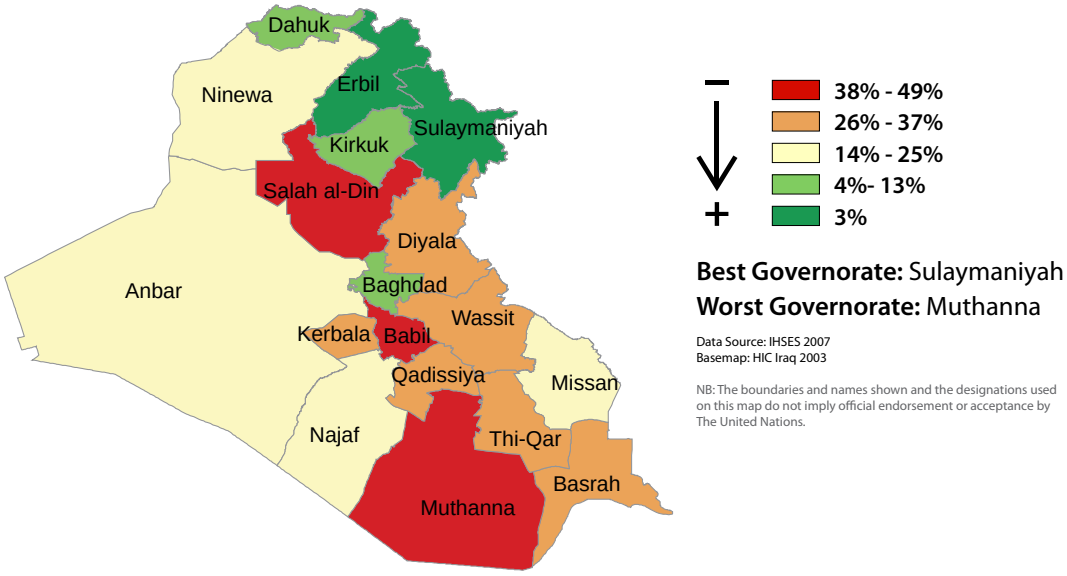
10 UN Iraq Common Country Assessment; WHO Cholera Situation Report no. 108 International Week 36 2009

11 UNICEF/COSIT/KRSO/Ministry of Health, Multiple Indicator Cluster Survey (2006).

12 World Bank/COSIT/KRSO Iraq Household Socio-Economic Survey (2007).

13 COSIT MDG Report 2007

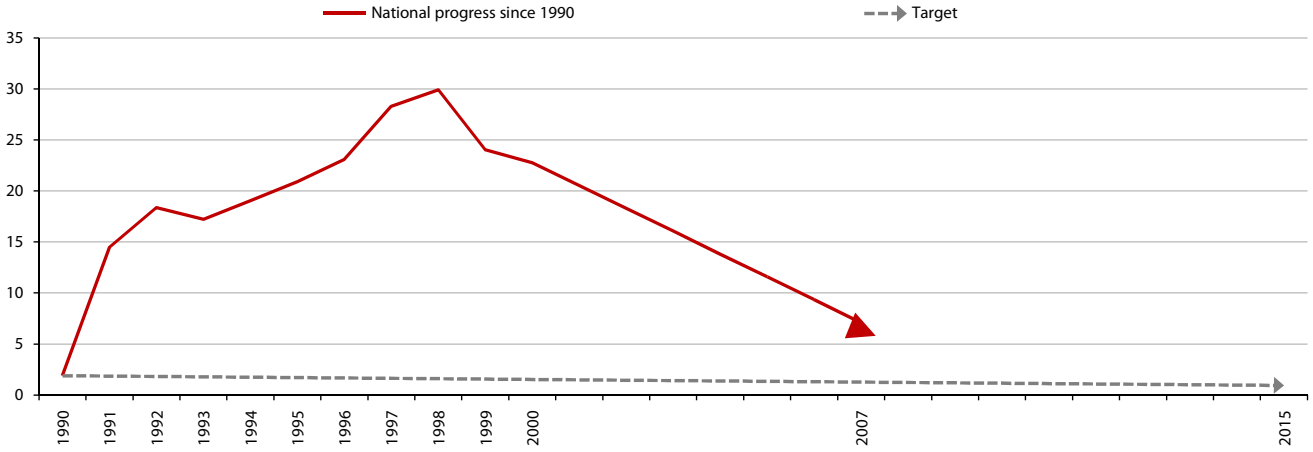
Figure 2 - Proportion of population below National Poverty Line (US$ 2.2 per day)



decrease the proportion on households with non-secure tenure from 16 per cent in 1990[14] to 8 per cent by 2020. Currently, 9 per cent of households have non-secure tenure.[15]

Progress in water management will also contribute to Iraq's efforts to prevent the degradation of its environmental resources under MDG Seven. Forest coverage remained static between 1990 and 2003 at 4 per cent.[16] Iraq faces considerable challenges in its efforts to increase this percentage to its national target of 10 per cent by 2015.

Figure 3 - Percentage of population consuming below the minimum recommended daily energy consumption

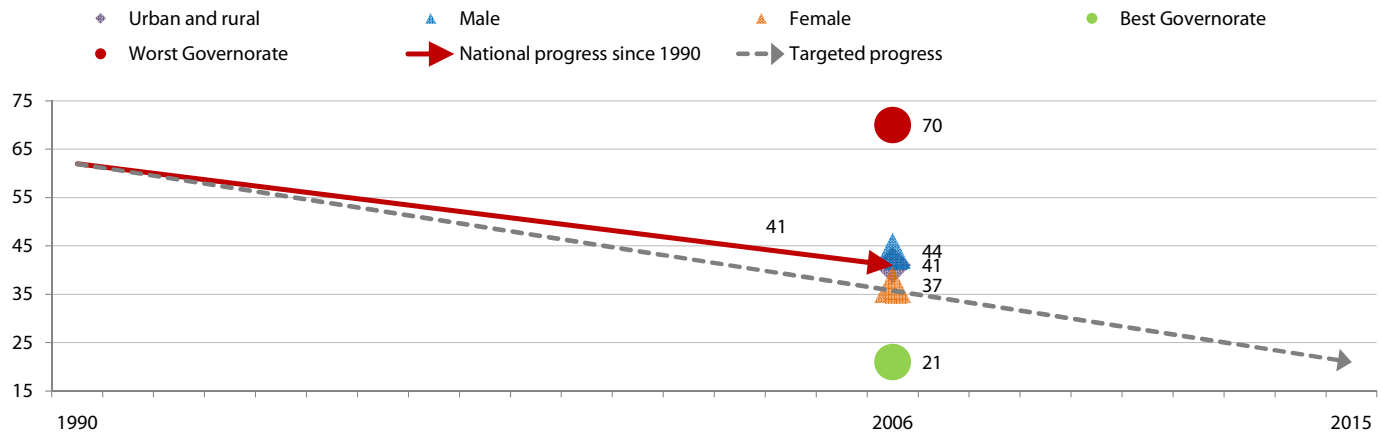


The arrows on the graphs are based on two values – for example, one for 1990 and one for 2006. The straight line produced may therefore not accurately reflect the improvements or deteriorations that have occurred in the intervening years.

Access to safe water and food will play an important role in Iraq's efforts to reduce child mortality under MDG Four. Diarrhoea, exacerbated by malnutrition, remains a significant threat to life for children under the age of 5.[17] The mortality rate in this age group dropped from 62 to 41 for every 1,000 live births between 1990 and 2006.[18] [19] 85 per cent of these deaths occurred within the first year after birth.[20] Further progress in access to safe water and food is required if Iraq is to meet the target of 21 deaths per 1,000 live births by 2015 (see *Figure 4*).

14 Ibid.
15 World Bank/COSIT/KRSO Iraq Household Socio-Economic Survey (2007)
16 Agriculture Research and Studies (1990); COSIT MDG Report (2007)
17 UN Common Country Assessment: Iraq (2009)
18 Maternal and Child Mortality Survey (1990)
19 UNICEF/COSIT/KRSO/Ministry of Health, Multiple Indicator Cluster Survey (2006).
20 UNICEF/COSIT/KRSO/Ministry of Health, Multiple Indicator Cluster Survey (2006).

Figure 4 - Under-5 mortality rate (for every 1,000 live births)



Knowledge and Capacity Development

Globally, investments in the water sector have often failed to bring about the expected outcomes, largely due to the lack of attention given to enhancing knowledge and developing capacity. Infrastructural investments will deteriorate if not properly maintained by adequate human resources and institutional capacity within an enabling environment. [21]

As a middle income country with generally sufficient infrastructure assets to provide adequate water services, Iraq still requires a self-assessment of knowledge and capacity needs to assist water resources managers in all challenge areas in setting priorities, identifying gaps and improving the effectiveness with which they can respond to a continuously changing environment.[22]

The challenges faced by Iraq are exacerbated by the absence of a longer term vision for integrated water resource management and strategic partnerships with academia and the private sector to open the field for additional research and progress. In terms of institutional governance challenges, Iraq continues to labour under a highly centralised system of control that hinders responsive service delivery at the local level. There is a lack of adequate data and information as a basis on which to manage the sector. Data gaps exist at all levels, leading to poor decision making systems, the inefficient use of water and associated resources, and lost opportunities to allocate scare water resources to achieve the largest possible socio-economic impact. This also leads to sub-optimal financial investment decisions in the long term. Such entrenched, yet with the proper intervention, easily reversible policies cause further challenges directly on the ground. For example, a culture of ensuring management of unaccounted for water has yet to be instituted through the establishment of management cells in Directorates. And urban centres continue to be over-prioritized resulting in ill-equipped and ill-maintained services in rural areas.

In terms of human capacity, insufficient numbers of staff are aware of the basic tenets of water resource management and climate change issues, both of which have huge bearing on the status of the sector. A lack of a proper human resources management system, sufficient training plans or systematic means for knowledge transfer (both among Iraqis and from international experts to Iraqi staff) have also contributed to dwindling of human capacity.

On the basis of this analysis, the UN's intervention will require a central and extensive element of knowledge and capacity development to ensure ownership, accountability, and sustainability. Such an approach will foster the development of knowledge and skills in the central government, governorates and municipalities for improved management of water resources along the following key elements:

» Development of a National Water Policy and comprehensive strategy for water resource management;

21 UNESCO Institute of Water Education. Water: A Shared Responsibility.
22 Ibid.

- Establishment of a National Water Council with the aim of engaging all relevant bodies and stakeholders, from decision-makers to representative water users, to establish effective national water policies and strategies that properly address Iraq's water supply and demand issues;
- Enhancement of knowledge development and creation of robust Information Management Systems for improved planning and decision making in all relevant ministries;
- Fostering of greater inter-linkages between the government, academia and domestic/international research institutes and think tanks that can contribute to the attainment of strategic goals in this sector;
- Adapting policies and institutional structures to encourage private sector participation;
- Supporting Government efforts to develop and implement a communication strategy for holistic management of water;
- Updating water-related legislation and support the establishment of mechanisms for better enforcement;
- Enhancement of capacity-building targeting institutions and staff in all areas (e.g. planning, designing, budgeting, operation, management, emergency preparedness, water quality monitoring and surveillance, etc.);
- Linking water and climate change; providing support for enhancing institutional and technical capacity for coping with the effects of climate change on the region's water-dependent sectors and promoting regional technical cooperation to this end;
- Support the establishment and development of a Disaster Risk Reduction mechanism at the national level that explicitly incorporates responses to drought conditions and helps coordinates activities at the national and regional level.

Priority Areas

In an effort to best utilize the respective comparative advantages of UNAMI and the UNCT, the following areas have been identified as priority areas for an integrated intervention. While no one intervention will address all priority areas, progress in these fields will have sweeping ramifications for Iraq's socio-economic and political development.

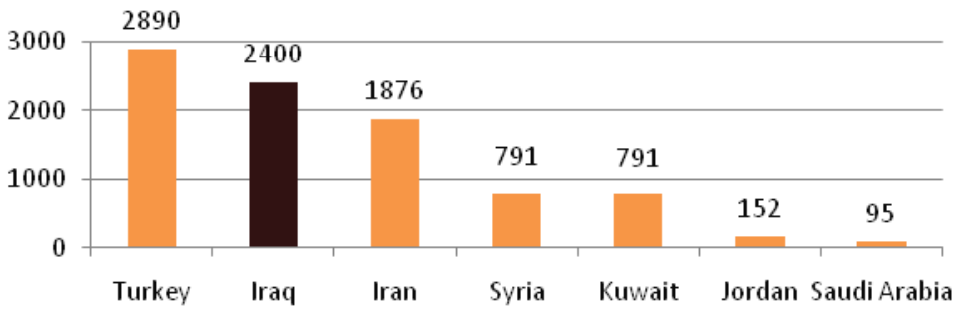
1. **Quantity of water:** The availability of and access to sufficient quantities and minimum environmental flows for households, agriculture, energy, and industrial use.

   Outcomes: (1) By 2012, Iraq possesses improved capacities to augment supply.

   (2) By 2012, Iraq possesses enhanced capacities to improve efficiency and access of water utilization.

Current theoretical estimates of water actually available for Iraq are 75 km^3, or 2,400 m^3 per person per year. Taken in the regional context, Iraqis have more water available to them than their neighbours, with the exception of Turkey (see *Figure 5*).[23]

Figure 5 - Water availability (m^3/per capita)



Source: Ministry of Water Resources Iraq 2010

The proportion of surface water to sub-surface water is estimated to be between 60-90 per cent of available water, while less is known about the

23 FAO, 2010.

water stored and flowing in Iraq's aquifer systems. Large areas of the country continue to be solely dependent on groundwater.

Considerable variability in the climate, upstream supply, and domestic use have caused Iraq's hydrological system to undergo dramatic change over the past 30 years. A shortage of perennial surface water has meant that reservoirs, lakes and rivers are diminished to critical levels. Water levels in the Tigris and Euphrates rivers, Iraq's primary sources of surface water, have fallen to less than a third of their normal capacity.

With national available water supply dropping to approximately 9 per cent of full capacity in December 2009, the government estimates that it is down to 20 per cent of its reserves, and that close to two million Iraqis face severe drinking water shortages. And complementing a trend in increasing dependence upon water beneath the surface, signs of groundwater resource decline are also emerging. Discharge from wells, springs and traditional aqueduct systems such as the karez is diminishing or desiccated completely, especially in the more rain-dependent northern region, including Erbil, Dahuk and Sulaymaniyah. With declining water supplies and lower precipitation, the overall availability of water per person in the northern governorates has dropped to 1,400 m^3, well below the current national average.[24]

The primary supply-driven factors impacting water availability in Iraq include natural and human-related phenomena. Drought conditions from 2005-2009 were a major factor, causing severe stress on supply. With variability of precipitation expected to intensify over time, the risk of scarcity is increasing. Iraq also depends greatly on precipitation falling outside its borders (53 per cent dependency ratio for all of its water), meaning that Iraq's supplies are significantly vulnerable to climate events and storage projects occurring in Turkey, Syria and Iran.[25] The prospect of increasing flows coming into the country from external sources (both surface and transboundary sub-surface watercourses) can only be met with international agreements with Turkey and Syria and increased rainfall in those countries. Meanwhile, the nation's conveyance and storage infrastructure, consisting of canals, wells, pumping stations, dams and reservoirs, are insufficient to meet current demand even at full capacity.[26] Management of aquifers and their recharge has been minimal, impacting the level and quality of groundwater supplies.

Availability is also subject to specific demand-related factors. As Iraq's population grows and moves to urban centres, requirements for drinking water, sanitation and food will only increase. An expanding, diversifying economy will also demand more of the resource. Government efforts to expand agriculture, which already utilizes up to 90 per cent of available water, will increase competition for water with basic drinking water, sanitation and energy production.[27] [28] The linear northwest to southeast nature of the hydrological flow in Iraq also means that a withdrawal occurring upstream will impact availability for downstream users, as the case of the Marshlands demonstrates. Volume losses due to system inefficiencies (i.e. seepage, leakage, evaporation, wastage) also affect availability, as does freshwater that is rendered unusable by becoming saline or contaminated.

The government's capacity to augment supplies and properly manage demand is a major determinant of availability. Currently, the delivery of adequate supplies of water to end-users is largely hampered by a shortage of skilled water managers, inadequate planning capacities, and an inconsistent knowledge of the resource, particularly that of sub-surface resources. Despite the importance of sub-surface resources to the national supply, groundwater remains neglected partly because it is invisible and difficult to monitor, and partly because the data for understanding it are limited. Furthermore, Iraq still lacks an effective long-term vision for integrated management of its water.

If unaddressed, the continued decline of water supplies and the pressures put on them point to an increased vulnerability and insecurity. At current rates, Iraq's water supply will fall to an estimated 43 km^3 by 2015, far

24 MEMRI Inquiry and Analysis – No. 537, "Water Crisis in Iraq: The Growing Danger of Desertification," July 23, 2009.
25 AQUASTAT, 2009.
26 MEMRI, "Water Crisis in Iraq."
27 FAO: "Agricultural Overview, Feb. 2009," and Dr. Donald Allen Van Atta, "Agriculture in Iraq: Reflections and Recommendations," presentation to the Iraqi Government.
28 ESCWA Water Development Report 1: Vulnerability of the Region to Socio-economic Drought."

short of the 77 km^3 that the country will need to avert the desertification of 1.5 million hectares of agricultural lands and a widespread humanitarian crisis.[29] According to a UNESCO-US Government model, the outlook for annual surface water supply from 2010 to 2047 shows severe shortages for Iraqi agriculture (18 km^3/year), the Marshlands (26 km^3/year), as well as for municipal, and industrial use.[30] An international report recently warned that the Tigris and Euphrates rivers could completely dry up by 2040.[31] The accelerating decline of water supplies and increasing demand threaten to bring Iraq closer to the water poverty threshold (1,000 m^3 per capita).

The Federal Government counterparts with mandates related to quantity include the Ministries of Water Resources, Municipalities and Public Works, Agriculture, and Industry and Minerals. Locally, mandates are scattered across governorate and district level directorates and local water authorities. Kurdistan Regional Government (KRG) counterparts include the Ministries of Agriculture and Water Resources, and Municipalities and Tourism. Government obligations that relate to water quantity are contained mainly in the International Covenant on Economic, Social and Cultural Rights and the UN Watercourses Convention (1997) to which Iraq acceded in 2001.

2. **Quality of water:** Meet quality standards for use by households, agriculture, environment and industry.

   Outcome: By 2012, Iraq has enhanced capacity to attain and enforce its national and international water quality standards.

Iraq's quality of drinking water and water used for agriculture is poor, and violates both Iraq National Standards and WHO guidelines.[32]

The most important sources of drinking water are the Tigris and Euphrates river systems, with dozens of large-scale municipal supply river water intakes located in the central plain region. Much of the groundwater along the developed central plain is saline or polluted, preventing its use. However saline shallow village wells continue to be widely used in rural areas.

Water-borne diseases are widespread due to polluted drinking water supplies. A cholera outbreak was reported in the second half of August 2007. Analyses indicate the main causes as poor quality of drinking water, increased salinity, poor sanitation and dilapidated infrastructure. By January 2008, nearly 5,000 confirmed cases were reported in 46 districts of 11 governorates. Similarly the number of diarrheal cases in 2009 is estimated at over 760,000.[33] The increase in reported diarrheal cases can be linked to usage of polluted water and a lack of hygiene awareness among local communities, particularly vulnerable groups such as women and children.

Reports from the Iraqi Ministry of Environment for 2009 indicate that bacteriological contamination in the water supply varies between governorates, ranging from 2.5 per cent to 30 per cent with an average of 16 per cent, greatly exceeding the Iraq National Drinking Water Standards and WHO Guidelines for Drinking Water permissible limit of 5 per cent.

Such bacteriological contamination is primarily due to the following:

- Sources of water such as wells are not fully protected from contamination and vandalism. Conditions in and around the sources such as unauthorized bathing, washing clothes, and entry of animals contribute to this contamination.
- A dilapidated water distribution network consisting mostly of corroded, broken and leaky pipes allows for the entry of free-flowing sewage, improperly dumped garbage, and cross-connection/flow of sewage into the pipes.
- Derelict industrial infrastructure still operates with outdated technology. Wastewater is generally

29 Ministry of Water Resources, Iraq. 2009.
30 UNESCO/Sandia, 2009.
31 European Water Association.
32 State of Disaster Risk Reduction in Iraq, The. Earl Goodyear, 2009
33 Ministry of Health, Iraq. 2009.

discharged, untreated, to rivers and groundwater.

- The poor state of the electricity networks, especially the thermal generation plants, has generated massive water pollution. The limited water treatment systems are unable to adequately process the waste material, discharging large quantities of waste water to rivers and ground.
- A lack of proper sewerage systems and unhygienic disposal of household wastewater continues to be practiced in many places. At least 250,000 tons of raw sewage is pumped into the Tigris River daily, threatening unprotected water sources and the entire water distribution network.
- Consumers directly and illegally puncture the main water-supply lines with their individual and unhygienic leaky plastic hoses causing direct and continuous contamination, due in large part to a lack of public environmental health awareness. Further contamination of water at home is due to a lack of personal hygiene and improper water storage practices at the individual, family and community levels.
- Unsustainable water chlorination and continuous power failures/breakdown are hindering all efforts made to date to improve the situation.

The quality of water used for irrigation under the arid and semi-arid climatic conditions of Iraq is of crucial importance to agriculture. Most of the saline area in central and southern Iraq is a result of using irrigation water with varying salt content. This leads to salinity accumulation in the soils, particularly locations where natural drainage is absent, as a large amount of salts accumulate in the soil during irrigation and rapid evaporation.

The main criterion affecting quality of water for irrigation is total soluble salts.[34] Among these salts, specified ions are important,[35] and some ions of toxic nature significantly affect agriculture production.[36] The total salt content of irrigation water creates a chemical effect on plants, while also affecting the soil infiltration rate, thus retarding plant growth.

Livestock in rural areas are greatly affected by such water quality. Numerous localised conditions may have an impact on the quality of water used for livestock, but among those concerning ionic content, magnesium is the most detrimental to animals.

The Total Dissolved Salts (TDS) of the river water in Euphrates varies with time from 457 parts per million (ppm) in the 1980s to 1200ppm in 2009 reflecting a sharp deterioration of incoming water.[37] In general, the water of the Tigris River is of better quality.

A successful water-quality monitoring programme alone is not enough to improve and assure the quality of water consumed by people. Water safety and security as a right to the public cannot be guaranteed unless all sources of contamination are fully assessed, addressed, and remedied. Future interventions will need to emphasise:

- Supporting the development of a national policy on minimum health requirements for water;
- Developing national legislation requiring a minimum for healthy water as part of a broader water resource management strategy;
- Supporting the upgrading of regulation and standards on national drinking water quality to shift towards preventative water quality management and operationalised water safety plans;
- Providing capacity building and training on upgrading the national drinking water quality management system;
- Providing technical support to the introduction and operationalisation of water safety plans;

34 Estimated either by the electrical conductivity in deci-Siemens/meter (EC dS/m) of the water or by the Total Dissolved Solid parts per million (TDS ppm).

35 Including, but not limited to, calcium, sodium, potassium, magnesium, chloride, carbonate and bicarbonate.

36 Such as sodium, boron, nitrates, chloride and bicarbonate.

37 Ministry of Water Resources, Iraq. 2010.

» Contributing to produce evidence to guide policy and strategy making. This may include, *inter alia,* support to population based surveys, advocate for evidence-based efficient management and use of water resources, and support in establishing a normative framework.

Perhaps most importantly, the Government of Iraq should consider effective allocation of financial resources needed for the improvement of the water resource management sector in general.

To respond to the need to improve the quality of drinking water, the UN at present works closely with the Government of Iraq primarily through the Ministries of Municipalities, Environment, and Health in addition to the Mayoralty of Baghdad. In the KRG, the key counterparts include the Ministries of Municipalities and Tourism, Environment, and Health.

3. **Water Policy and regulatory coordination among line ministries and within KRG:** Policy-level coordination among various water actors within the Government of Iraq line ministries and within the KRG.

   Outcome: By 2012, Iraq's mechanisms for enhanced policy and regulatory coordination are established.

4. **Operational and information coordination between line ministries, governorates and KRG:** Operational and information coordination between Government of Iraq line ministries (national level) and governorates/local communities (sub-national level).

   Outcome: By 2012, information management framework and systems are in place and utilised by the Government in the management of its water resources.

While water policy/regulatory coordination (Integrated Priority Area 3) and operational/information coordination (Integrated Priority Area 4) have been identified separately to indicate two distinct challenges, the two are inextricably linked and thus analysed together.

The issue of water resource management continues to be of pressing concern to Iraqi policymakers and the public alike. One of the principal challenges with respect to water management is the coordination of a range of diverging ministerial and regional interests at the domestic level.[38]

Awareness on the degradation of Iraq's natural resources and ecosystems is high among Iraqi decision makers; however, concrete actions at the local and national level remain uncoordinated and limited. Mostly this is the result of the continuous systemic and structural weakness of the local and national Iraqi government to jointly develop policies, strategies and programmes that address the degradation. This lack of cohesion is articulated in a continuous centralized top down decision making culture, the unwillingness to share freely resources and information to commonly identified objectives, and the struggle between central and local government.[39]

The positive aspect of the water sharing file is the shared interest on the part of most, if not all Iraqi political factions in securing improved access to water flows from the neighbouring states along Iraq's northern border. This interest, consistently expressed to the UN by Iraqi interlocutors, suggests a preliminary assumption that early progress on this issue could improve the levels of trust among key decision makers, which may then positively impact other substantive areas, including hydrocarbon management.

The UN has organized and conducted a series of parliamentary-ministerial roundtable discussions on this subject in July 2008 and June 2009. During these events, UNAMI proposed that the approach to this issue should include the development of a national water strategy, with constitutional, legislative and institutional underpinnings, including the potential establishment of a National Water Council that would be charged with the coordination of ministerial interests and the corresponding policy formation.

Iraqi ministers and parliamentary leaders have requested ongoing UN support on this file, particularly

38 These interests include, among others, the federal Ministries of Water Resources; Electricity; Agriculture; Health; Planning; Oil; Municipalities and Public Works; Environment; as well as the respective counterparts in the Kurdistan Region Government; and the Governorates of Baghdad, Diyala, Basra and others currently affected by the drought and water quality/distribution issues.
39 State of Disaster Risk Reduction in Iraq, The. Earl Goodyear (2009).

enhancements to operational capacity, as well as constitutional and legislative/institutional development. It is therefore proposed that the UN explore the prospects of taking forward the discussion of June 2009 in an integrated manner and initiate the next steps of facilitating the development of an Iraqi work plan that would include operational and governance aspects of the water sharing file.

There are two specific levels of coordination/negotiation at which the Government of Iraq (and, by extension, the UN) would be engaged in the development and implementation of a national water strategy:

- Federal – Federal Coordination
- Federal – Regional Coordination

Federal – Federal Coordination

The divergent ministerial interests in the resource of water will require coordination within the executive branch of the federal government. To assist effectively, the UN would need to work in the context of the reality that key ministries are still held by opposing political factions, some of which may actively attempt to prevent 'successes' on the part of any sitting administration. In other cases, it may simply be the substantive regulatory responsibilities that stand in conflict. The Ministry of Oil, for example, requires significant amounts of water for the production of oil, while other ministries (e.g. Agriculture, Electricity) require water for very different objectives.

The first logical step, therefore, would be for the UN to conduct a political survey of the key ministries involved, including current/projected ministers; key policy interests; and operational concerns. It would be advisable to suggest to the Government of Iraq that a comprehensive internal policy/legislative review be conducted in each ministry that claims to have an interest in the resource. This step would invariably raise other, vertical policy reviews in such portfolios as agriculture, industry and the environment. In short, it would be a complex but necessary task, particularly if the alternative, that is, continued "muddling through" is to be rejected. Legislative gaps would be identified through this process, as well as areas in which strategic and operational coordination between ministries would be required or desirable.

The results of the policy/legislative reviews within the individual ministries would then inform the debate about what type of institution would be most appropriate to coordinate policy at the level of the federal executive in support of an integrated national water strategy. While Iraqi discussions have already begun on the formation of a National Water Council, it is, ultimately, the extent of policy divergence among ministries that would determine the institutional power that such a council would need to be given in order to effectively discharge the function of supporting an integrated, national strategy. This decision is very likely to be politically contested. Once it is agreed upon, the institution would be given a legal basis, ideally at the constitutional level, followed by enabling legislation.

Federal – Regional Coordination

The next logical step would be coordination between the Government of Iraq and the regions, including, most prominently, the KRG, the South and Anbar. In practice, this effort will likely run in parallel with the promotion of federal – federal coordination, as it is assumed in principle that each federal ministry already has some mechanism of engagement with the respective provincial governments (minus the KRG).

If the aspiration is the development of a national water strategy, then formal coordination with the KRG, which runs its own respective ministries charged with water resource management, would need to be conducted via a federal executive entity within the Government of Iraq. At the same time, the KRG would first have to align its interests internally to be able to dialogue effectively with the executive in Baghdad.

The institutional foundation for Government of Iraq – KRG coordination on water resources may then take one of two forms. The KRG could formally participate in a National Water Council, along with other governorates and federal ministries. This would give the KRG the effective status of a federal ministry. On the assumption that this Council would need to operate by consensus, this approach could weaken the position of the federal executive.

The alternative approach would be a more hierarchical sequence of federal – federal followed by federal – regional coordination. This option would strengthen the relative position of the federal executive, as it could approach the KRG with a coordinated, unitary vision for the rest of Iraq. It should be noted that the KRG would have significant leverage on these negotiations as a *de facto* upstream user of the resource.

In short, if the aim is to optimize the setting for the development of a coherent national strategy on water resources in the current political context, the second approach may be preferable. In that case, the most appropriate institution would be a coordinating council in which the Government of Iraq, as one entity, the KRG and remaining governorates would participate. This would resemble, in a sense, a "mini-Federation Council," but with an executive rather than legislative role. Like the federal coordinating institution described above, the UN could assist in the development of the constitutional and legislative underpinnings of this council.

5. **Mitigating the pressures put on Iraq's ecosystems:** Minimize and, where possible, reverse the impact of human water-related activities (e.g. diverting, polluting, or wasting) that disrupt ecosystems and harm the natural environment.

   Outcome: By 2012, Iraq has enhanced capacity to prevent and mitigate environmental degradation in hydro ecological systems.

Iraq's ecosystems face immense challenges, as decades of conflict have aggravated the effects of decades of neglect for its ecosystems.

The Government of Iraq has identified the environment as one of the target sectors within the NDP in order to meet international treaty obligations and ensure that its plans for economic and human development include environmental considerations. The UN's primary focus will be on mitigation of Iraq's environmental situation to avoid further regression, and to lay the foundation for forward movement on key environmental issues with sub-national, national, and regional impact.[40]

Iraq's population is narrowly concentrated around the agricultural belt along the Tigris and Euphrates rivers, and the delta where they join, just before entering the Persian Gulf. Most of northern Iraq is covered by rugged, mountainous terrain. Moving south, the mountains descend into a flat, fertile, central alluvial plain, which includes the valleys of the Tigris and Euphrates rivers. The extreme south-eastern portion of Iraq is a low-lying, marshy area bordering the Persian Gulf. In ancient times, these marshes were part of the Persian Gulf. This is the homeland of the Marsh Arabs, a once heavily repressed Shiite group.

The Tigris and Euphrates rivers meet about 150 kilometres north of the Persian Gulf to form the Shatt al-Arab, which drains into the gulf. Irrigation canals have been built between the two rivers, providing water that is crucial in the desert environment for irrigation and drinking. The canals have been built to divert water of the higher-lying Euphrates to the west, across the valley into the Tigris. The Iraqi government has also built a series of dams on the Tigris and Euphrates for irrigation and for flood control.

The north-eastern highlands receive the most rainfall, and from October to May precipitation can range from 500 to 1000 mm. Further south, on the central plain and near the Persian Gulf, precipitation is much lower averaging only 100 mm annually.[41] The downward trend in water discharge to Iraq offers a grim forecast for the future. Statistics suggest that surface water resources for irrigated-agriculture are expected to further decrease in the coming years as upstream dams are completed (see *Table 1*).[42]

Table 1 - Average Discharge of Water to Iraq (billion m^3)

	2009	2025
Tigris	49.20	9.16
Euphrates	19.34	8.45

40 State of Disaster Risk Reduction in Iraq, The. Earl Goodyear, 2009.
41 CIA World Factbook.
42 Ministry of Water Resources, Iraq. 2010.

Environment change also presents challenges in the form of drought caused by significantly decreased rainfall – particularly in 2007 and 2008 – and desertification. According to the Ministry of Water Resources, Iraq received only 30 per cent of expected rainfall in 2008. Low regional rainfall also affects water levels in the upstream parts of the Tigris and Euphrates rivers and, therefore, further reduces water discharge volume to Iraq, contributing to desertification.

The Iraqi Marshlands are the largest wetlands in southwest Asia and has been recognized as one of the world's most exceptional ecosystems. Historically, the Marshes contributed to the broader human welfare of the population of southern Iraq through the provision of freshwater and a basis for livelihood for almost 500,000 Iraqi Marsh Arabs. The Marshes can be divided into three separate marshes: the Al-Hammar Marshes in the west, the Central (or Qurnah) Marshes, and the Al-Hawizeh Marshes, which lies on the border of Iraq and Iran. Over the past two decades, there was a deliberate draining of the wetlands that resulted in massive ecological, social and economic impacts to the peoples of the region. By 2000, the surface area of the Marshes had been reduced 14 per cent of its original size.[43] The Iraqi people and the Ministry of State for Marshlands Affairs have placed a great emphasis on the restoration of the Iraqi Marshes.[44]

The drought of 2007 – 2009 has placed additional emphasis on the vulnerability of Iraq's ecosystems. A study conducted for disaster risk reduction support in 2009 noted,

> Over the last two decades (1988-2007), 76 per cent of all disaster events were hydrological, meteorological or climatologically in nature; accounting for approximately 45 per cent of the deaths and 80 per cent of the economic losses caused by natural hazards. The likelihood of increased weather extremes in the future therefore gives great concern that the number or scale of weather-related disasters will also increase. While in 2009, more rain was received than in 2008, the situation is still critical with rainfall 50 per cent below normal.[45]

In the same report it was estimated that Iraq has several thousand contaminated sites resulting from a combination of general industrial activities, military activities, post-conflict damage and looting. Many of the sites are derelict and open to public access. They contain substantial quantities of hazardous waste and present a threat to human health and to the environment.

The importance of hazardous waste and land contamination issues on a particular site is strongly linked to its surroundings and in particular to the vulnerability of the local natural environment and population. Assessing these factors on a national scale can help to identify important areas and topics for assessment. For the natural environment, the indicators of importance are biodiversity and sensitivity to degradation. In general, the industrial areas in Iraq are sited in heavily developed regions of low biodiversity and sensitivity. Biodiversity is particularly low in the central plain and the Baghdad region due to the history of sustained agricultural activity and the population density in the riverine areas.

The most significant environmental receptors – people or environments – are the Tigris and Euphrates river systems and underground water aquifers. In the south of Iraq the most important areas are the Mesopotamian marshes, riparian zones, the estuarine Shatt Al-Arab and the coastal mudflats. For the population, the pattern of land use in Iraq indicates that the human health issues for contaminated land and hazardous waste are similar to those observed worldwide. Potential pathways to exposure from toxic chemicals on such sites include direct contact (site workers and trespassers), blown dust and drinking water.

Iraq has become signatory to the UN Framework Convention on Climate Change, the UN Convention for Biodiversity, the Ramsar Convention on Wetlands, and the UN Convention to Combat Desertification. These conventions are placed under the custody of the Ministry of Environment, which collaborates closely with other Iraqi ministries to develop the legislation and monitoring equipment to comply with these conventions.

43 CIMI, University of Waterloo, Ottawa, 2009

44 Integrated Water Management Concept Note, UN Iraq 2009

45 Disaster Risk Reduction Strategies and Risk Management Practices: Critical Elements for Adaptation to Climate Change. The Informal Taskforce on climate change of the Inter-Agency Standing Committee and The International Strategy for Disaster Reduction. 11 November 2008.

In the Kurdistan Regional Government, the Kurdish Ministry of Agriculture and Water Resources has been charged to monitor compliance. Additionally, a number of high level mixed committees have been put in place under the office of the Prime Minister to address issues on disaster risk reduction and drought.[46]

6. **Improve management of the competition for water:** Foster cooperation among various water users while minimizing the impact of reservoirs, hydro-electric dams, oil production, agriculture and other large-scale projects on the quantity and quality of overall water supplies.

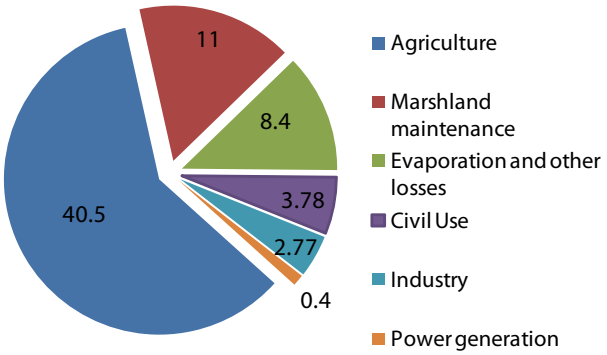
   Outcomes: (1) By 2012 Iraq manages its water resources in an equitable and efficient manner.

   (2) By 2012, Iraq has begun to take steps to mitigate the human and environmental impact of large-scale projects on the quantity and quality of its water supplies.

The estimated average annual need of water is 50 billion m^3.[47] By 2015, the forecasted need based on 3,180 m^3/donum/year is as indicated in *Figure 6*.

Increasing demand for Iraq's finite and ever scarcer water supply is causing competition among users of the resource to intensify. Arising from a complex web of sometimes opposing values attributed to the resource, competition for water in Iraq cannot be understood without considering the various dimensions at which it is manifested.[48]

Figure 6 - 2015 forecast for water required by sector (billion m^3)



Total required: 66.85 billion m^3
Source: Ministry of Water Resources Iraq 2010

Inter-sectoral competition occurs primarily between agriculture, domestic, industry and nature, the four direct consumers of water. Agriculture accounts for the vast majority of water consumption in Iraq, withdrawing 92 per cent of total freshwater for irrigation and food production.[49] The remaining share is consumed largely by Iraqi industries (5 per cent), which require large amounts of freshwater (1.25m^3/person/day) for manufacturing, cleaning and cooling.[50] Despite accounting for nearly three-quarters of Iraq's population, domestic water supply accounts for only 3 per cent of freshwater withdrawals. Competition has also been driven by an historical shortage of 5 km^3/year for agriculture in Iraq since 1930.[51]

In addition to competing with one another, agriculture, industry and domestic use also compete for water with nature, which requires a sustainable supply to maintain its health. Water diversions for other uses led to the disappearance of more than two-thirds of the Mesopotamian Marshes in southern Iraq since 1973. The trade-off from competition of this sort is the loss of irreplaceable services nature provides to human well-being, such as flood control, valuable nutrients, climate regulation and pollution control.

The linear nature of the Euphrates-Tigris basin lends itself to considerable *spatial competition*, particularly among upstream and downstream users. Irrigation, large dams and other diversions in the upper reaches of the Iraqi basin consume the bulk of surface water, with significant impacts on supply for downstream users, who must also contend with pollution and saline water originating upstream. The water in the lower reaches of the Euphrates River has been rendered unsuitable for drinking and some agricultural purposes, doubling in salinity since 1997.[52] Spatial competition is also manifested at local levels, as demonstrated by the proliferation of wells dug by neighbours competing over the same aquifer.

46 State of Disaster Risk Reduction in Iraq, The. Earl Goodyear, 2009
47 Ministry of Water Resources, Iraq. 2010.
48 Users of water attribute values, such as "sustainer of life" or "economic good", which can oppose one another.
49 Water Resources Institute. Inefficient use of water in 2005 resulted in farmers achieving only 20 per cent of potential production in rain-fed crops. United Nations World Water Development Report 3 (2009).
50 Roach, Jesse, et al, Strategy for Water and Land Resources in Iraq (SWLRI) Water Systems Planning Model (WSPM) Final Report, Iraq Ministry of Water Resources, Iraq Transition Assistance Office, UNESCO and Sandia National Laboratories, May 2009.
51 Ibid.
52 Ibid. Salinity levels at the Haffar Barrage, in Southern Iraq, were 950ppm in 1990. In 2010, salinity measured at 2,000ppm.

Competition is also felt demographically. From 1990 to 2008, Iraq's total population more than doubled to 30 million.[53] Iraqi cities swelled to over 20 million, or two-thirds of the total population, an indication that urbanisation is taking hold.[54] Given that water consumption in Iraq's urban areas is double that of rural areas (0.32 m^3 /person/day and 0.176 m^3 /person/day, respectively), competition between urban and rural users will continue to intensify.[55]

Demographic competition may assume other forms. The disproportionate burden placed on women for water collection and usage may be more acute during times of scarcity, a potential indication of gender competition. Meanwhile, the potential for ethnic competition could manifest itself as the Kurdish areas, being situated in the northern stretches of the Tigris-Euphrates river basin and receiving the bulk of the nation's rainfall, enjoy a hydrological advantage compared to the predominantly Arab areas in the centre and south.

The timing of water demand causes further competition. Iraq's annual supply of internal water resources are renewed primarily during the rainy season from November through March. The water needed to grow crops in the spring must be reconciled with the need for a stable year-round supply for municipal and industrial uses. Likewise, Iraq's present generation competes with future generations when it focuses on the full utilisation and distribution of existing supply of water. This lack of sustainability threatens future supplies and the health of the environment. Reconciling *temporal competition,* including seasonal or intergenerational competition, requires adequate harvesting and storage capacities.

By 2050, Iraq's population will double, and 8 out of 10 Iraqis will live in an urban area.[56] To keep up with this growth, agricultural self-sufficiency and industrial expansion are being pursued. The increased demand for water by these sectors will heighten competition, particularly inter-sectorally and spatially. With six large hydroelectric dams and expansion of oil production planned over the coming years, the energy sector will significantly increase its demand for water.[57] Exxon Mobil announced in 2010 that it will require 1.6-1.9 million m^3 of water daily to service its five new oilfields in the south.[58] The same amount of water could be used to produce at least 318,000 kg of wheat per day in northern Iraq or quench the daily water needs of every Iraqi household.[59] Nature will also have to compete more for its share of the resource. Restoring the Marshlands back to its 1973 water volume from current levels would require an estimated 9.3 billion m^3 and the diversion of water away from other competing uses.[60]

If these trends continue, demand will outstrip supply by 2015 and have significant consequences for users vying for their share of the resource.[61] [62] A UNESCO-US Government model estimates that planned storage and agricultural development upstream will lead to an average annual downstream shortage of 18 km^3/year for irrigated agriculture and 26 km^3/year for the Iraqi Marshlands from 2007-2047. Furthermore, the Tigris and Euphrates Rivers could be depleted by 2040.[63]

Unsustainable water management policies are major detriments in addressing Iraq's increasing competition for water. Government and user response has thus far been characterized by developing new water resources through the use of often unsustainable mechanisms, including reservoirs, dams, and ever deeper wells. Such supply augmentation strategies are constrained by environmental changes, reduced water supplies,

53 World Bank Development Indicators (2010).
54 Ibid.
55 Roach et al., Strategy for Water and Land Resources in Iraq, 2009.
56 Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision, http://esa.un.org/unpp. Accessed May 26, 2010
57 Roach et al., Strategy for Water and Land Resources in Iraq, 2009.
58 «ExxonMobil to use water injection to enhance southern Iraqi oil output,» World Tribune, April 30, 2010.
59 The United Nations World Water Development Report 3 (2009), reports that 1 m3 of water is needed to produce 1kg of wheat. Furthermore, Gleick (1999) estimates an average need of 50 litres/capita/day for household consumption. Estimates were calculated with a use of 10 million barrels of water.
60 According to the Canada-Iraq Marshlands Initiative (2010), the original water volume of the Marshes in 1973 was 14,800 million m^3, compared to 5,500 million m^3 in 2010. UNESCO estimates for restoring water volume assume a net gain.
61 CESAR Foundation (2005).
62 Dr. Jon Martin Trondalen, "An Independent Technical Study: The Euphrates River and the Tigris River Water Resources Management," in Water and Peace for the People –Possible Solutions to Water Disputes in The Middle East (Geneva: CESAR Foundation: 2006).
63 Ibid.

availability of storage sites, social, environmental and financial costs and weak government technical capacity.

Improving water demand and supply management, through strategic supply augmentation, conservation and reallocation, is crucial in order to sustainably reduce pressure on Iraq's water resources. An integrated strategy should focus on technological improvements, innovative management approaches, economic incentives and legal and regulatory approaches. Furthermore, policymakers must boost priority for the ecosystem as a direct user of water, and measures should be taken to protect ecosystem services. This will boost the well-being of the current Iraqi generation, while ensuring intergenerational equity and a sustainable supply of water resources.

A transparent national strategy for water resource allocation, incorporating all dimensions of water users and utilizing multiple-use approaches, would increase allocation equity and efficiency, reduce poverty and the mitigate the stress on Iraq's strained ecosystems.

The Federal Government counterparts with mandates related to water usage include the Ministries of Water Resources, Municipalities and Public Works, Agriculture, Industry and Minerals, and include governorate and district level directorates and local water authorities. KRG counterparts include the Ministries of Agriculture and Water Resources, and Municipalities and Tourism. Government obligations that relate to water quantity are contained mainly in the International Covenant on Economic, Social and Cultural Rights and the UN Watercourses Convention (1997) to which Iraq acceded in 2001.

Linkages to UNDAF and UNAMI Strategic Vision

The UNCT and UNAMI have prepared strategic planning documents to guide their work in Iraq in the coming years.

The UNCT's UN Development Assistance Framework (2011–14) will fully engage the Government of Iraq and will act as the primary business plan for the activities of agencies, funds and programmes over the coming four years. As the UNDAF document is officially endorsed by the Government, the UN's integrated efforts on water refer to following outcomes and contribute as outlined below.

Table 2 - Alignment with the Iraq UNDAF (2011-14)

	Iraq UNDAF Priority	Integrated Contribution
Priority Area Two	Inclusive, more equitable and sustainable economic growth.	Contribute to equitable distribution of clean water resources to benefit all economic sectors.
Priority Area Three	Environmental management and compliance with ratified international environmental treaties and obligations.	Support work ensuring water policies do not exacerbate environmental damage.
Priority Area Four	Increased access to quality essential services.	Contribute to provision of adequate quantities of clean water to all people living in Iraq.

The UNAMI Strategic Vision guide the work mandated to the political mission under Security Council Resolutions 1770, 1830, and 1883. The UN's integrated efforts on water refer to the programme imperatives and contribute as outlined below.

Table 3 - Alignment with UNAMI Programme Imperatives

	UNAMI Programme Imperative	Integrated Contribution
Disputed Internal Boundaries	Contribute to solving the territorial aspect of the Arab-Kurdish issue of disputed internal boundaries, especially in northern Iraq.	Contribute to essential social service delivery to help defuse tensions in disputed areas.
National Reconciliation	Support political efforts to resolve Iraqi security problems which are rooted in conflicts over access to power and over control of wealth.	Establishment of national water council can give voice to key stakeholders and work towards nationally acceptable solution to Iraq's water resource management.

Operationalisation

Iraq Partners Forum: Sub-group on Water

Iraq's water resource management needs will require extensive engagement and financial commitment to ensure institutionalized results and a lasting impact. It is the responsibility of the international community to provide much-needed financial and technical support to the Government of Iraq as it works to meet international standards and revitalize its strained ecosystem.

The Iraq Partners Forum Sub-group on Water facilitates the international community's support to the modernization of water resource management in Iraq. It meets regularly to monitor implementation progress, ensure coordination with other related bilateral projects, and mobilize the required resources under the principles of Government co-financing.

Information Sharing

A wealth of data from various actors exists on Iraq. The UN's Information and Analysis Unit serves as the central data pooling and dissemination service. The IAU will assist the work of the taskforce through the provision of this data in support of evidence-based planning.

UNDP has recently launched a Water Teamwork portal designed to retain institutional memory and resurrect past work. This portal is available to all relevant actors within the UNCT and UNAMI ensuring the greatest benefit to an integrated intervention.

UNESCO maintains an online international press monitoring service that can be utilized to scan the media for updates on water-related news items.

Communication

An effective communication strategy will be critical to the successful execution of this integrated intervention. Not only does the Government have a responsibility to communicate effectively with its own population, but the UN has a responsibility to communicate effectively both with the Government and the Iraqi people.

The Inter-agency Advocacy Working Group has drafted a Communication Action Plan on Increased Awareness for 2010. Once finalized and endorsed, this plan will provide the foundation for both core and complementary communication and advocacy activities.

Intervention Leads

While the intervention plan is both collaborative and integrated each intervention will have a lead agency or office.

Coordinated with Government commissioned Master Plan

The intervention plan will be implemented in coordination with the recently announced project to develop a Government Water Management Plan to avoid duplication and seek complementarity.

Government partnership

All interventions will be implemented in partnership with the Government in order to build capacity to sustain results and outcomes.

Cross cutting issues

Each of the interventions will address relevant cross cutting issues such as gender, human rights, environment, and employment.

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