Policy Brief

May 2019

The Collaborative Programme on the Euphrates and Tigris

Programme Summary

This policy brief addresses the overall role of the Collaborative Programme in the Euphrates and Tigris River Basin (CPET). The policy brief covers the following topics:

- Key messages
- Programme objectives, extent and duration
- Key participants
- The Role of CPET
- Project structure
- Approach and achievements
- Output reports
- Policy notes and recommendations
- Opportunities for Further Programming

Key Messages

- Water resources in the Euphrates-Tigris River system are finite and virtually fully exploited.
- The climate is showing shifts and changes will be severe long before the end of the century. This will significantly reduce available water.
- Countries must continue to collaborate if water is to be equitably and efficiently shared.
- To successfully manage water resources in a way that benefits all parties, it is important for all riparian countries to negotiate the sharing of resource. It is recommended that efforts to include Iran should be made; Iran has regrettably not been party to CPET.
- Development of a single common knowledge base on land and water resources of the transboundary Euphrates-Tigris basin is a must as a starting point for international negotiations and agreements.
- Plans to expand the development of hydropower and the continued expansion of irrigated agriculture need to account for the limitations of water resources.
- Hydropower can be sensibly developed and used as a source of balancing power with other renewables. Grid-sharing is essential to this.
- Water quality is deteriorating and water of poor-quality is limited in its use. It must be addressed through comprehensive management, pollution control in all sectors, and improvements in wastewater treatment.
- There are opportunities to increase water use efficiencies and agricultural water productivity.
- Countries must critically evaluate sectoral water needs and consumption levels, and the benefits this consumption delivers for production, socio-economic gains, and the environment.
- Restoration of the marshlands has been an important success. This can be furthered through careful and collaborative husbanding of and sharing of the water resource.
- Gender equity needs to be at the forefront of all policy, management, and research.
- More comparable, updated, and trusted data need to be identifed for all the countries
- Institutional capabilities in all countries need to be strengthened in order to better implement and monitor both existing and new regulations.

THE COLLABORATIVE PROGRAMME ON THE EUPHRATES AND TIGRIS

INTRODUCTION

The Euphrates-Tigris is a transboundary river basin that includes Iraq, Turkey, Iran, Syria, Saudi Arabia, and Jordan. This study focused on the main riparian countries: Iraq, Turkey and Syria, which represent 80% of the total area of the basin. Both the Euphrates and Tigris rivers originate in the mountains of eastern Turkey. They converge into the Shatt Al Arab in southern Iraq, near where the Marshlands of Iraq (a Ramsar site of great international significance) are fed by the Euphrates, the Tigris, and Karkheh. Together, they drain into the Gulf as the Shatt al Arab. The riparian countries are heavily dependent on the rivers for meeting their water requirements.

PROGRAMME OBJECTIVES

The CPET programme set out to achieve:

1. **Improved dialogue and trust in the management of transboundary water in the Euphrates and Tigris region**
2. **The generation and use of commonly agreed evidence-based information on Euphrates and Tigris regional water use and services.**

The CPET programme was a five-year funded programme by **Sida**, with initial work beginning September 2013 and ending August 2018. The CPET extended until June 2019 to complete reporting activities.

KEY PARTICIPANTS

The Collaborative Programme on the Euphrates and Tigris (CPET) has been managed by the **International Center for Biosaline Agriculture (ICBA)**. ICBA is a not-for-profit, international centre of excellence for research and development targeting marginal environments where natural resources are either limited or have been degraded. A further five Implementing Partners worked in collaboration:

- Stockholm International Water Institute (SIWI)
- American University in Beirut (AUB)
- Stockholm Environment Institute (SEI)
- International Center for Agricultural Research in the Dry Areas (ICARDA), and the
- Swedish Meteorological and Hydrological Institute (SMHI).

The three Country Partners participating in CPET (Iraq, Turkey, Syria) included the following key institutions:

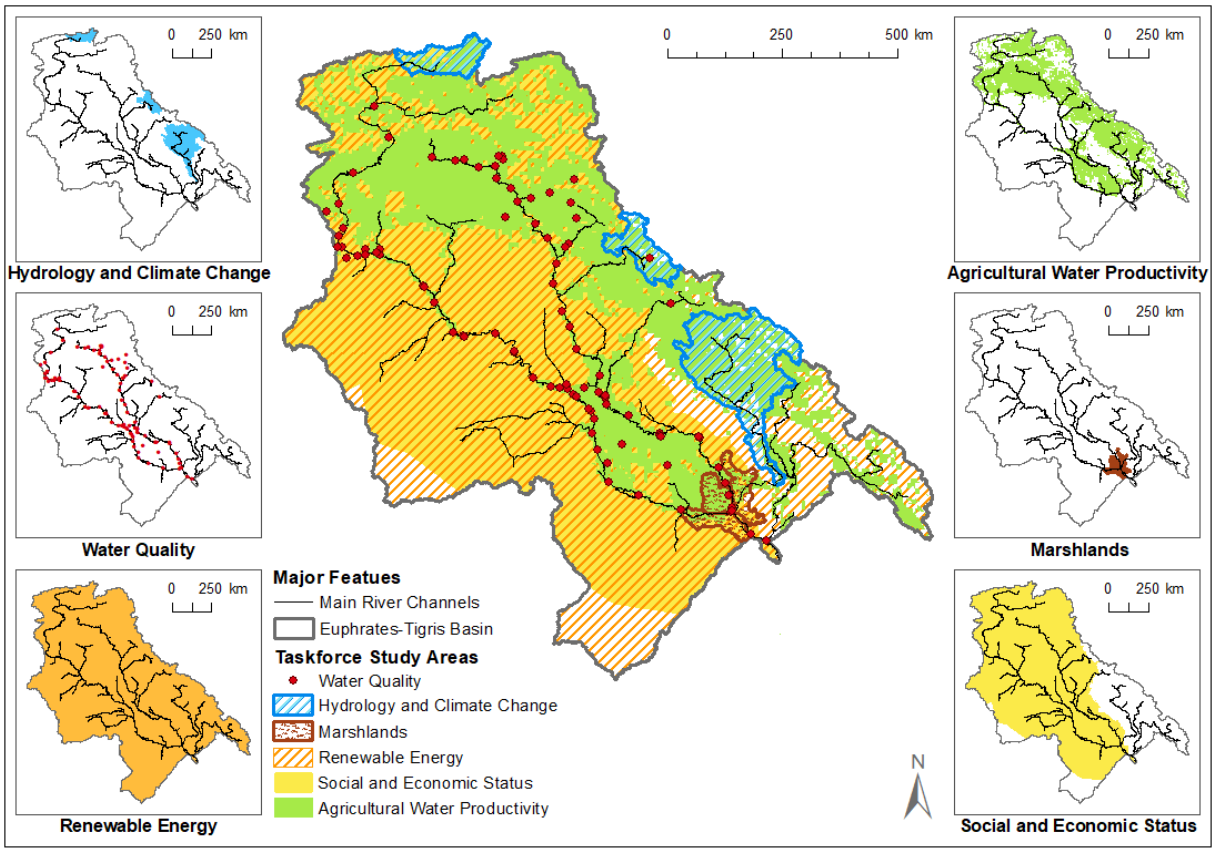
- **Iraq:** *Ministry of Water Resources, Ministry of Environment, Ministry of Agriculture,* and **KRG:** *Ministry of Agriculture and Water Resources, Kurdistan Regional Government*
- **Turkey:** *Turkish Water Institute (SUEN), Ministry of Agriculture and Forestry*
- **Syria:** *Syrian consultants (Independent Consultants)*

The CPET Implementing Partners, supported by the Country Partners' experts, conducted a diverse range of analyses related to the water resources and people in the Euphrates-Tigris basin. Outcomes from individual Task Forces report are summarised in the final report drawn up by the ICBA, *Synthesis Report*. More than 30 further actions are recommended. Reporting includes the findings of the Country Partners and inputs from public sources. The lack of accessible recent research, data and information from within the basin has been a major constraint to scientific reporting. Future work needs to close these gaps if equitable and efficient management of the basin's water resources is to be attained.

THE ROLE OF CPET

Water is a fundamental component for maintaining peace, stability, and prosperity in the region. The programme involved a variety of tasks and initiatives that supported the accomplishment of the major objectives. Country Partners recommend the continuation and expansion of several activities and areas for further collaboration. These include:

- Technical and information exchange meetings
- Monitoring and data sharing between riparian countries and key stakeholders in the basin
- Synchronisation of national development plans such that they prioritize a regional growth perspective
- Joint modelling exercises (e.g. HYPE for water quantity and quality modelling).



The spatial extent of the activities of the six taskforces of CPET within the Euphrates-Tigris basin.

PROJECT STRUCTURE

The scope of the project was multi-disciplinary by design; the project was divided into six taskforces (TF), each led by one Implementing Partner organization and supported by Country Partner experts from each country. They were:

1. **TF-HCC: Hydrology and Climate Change** Led by SMHI, TF-HCC was briefed to evaluate the overall water balance for the Euphrates-Tigris basin for past, present, and future climate, and to select and develop appropriate tools and models to this end. This objective included water use and consumption for different sectors.
2. **TF-E: Hydropower:** This task force addressed the role of hydropower and its potential for development in the Euphrates-Tigris basin. Hydropower was also assessed in relation to other sources of renewable energy, both now and in the future. TF-E was led by SEI.
3. **TF-WQ: Water Quality:** Led by ICBA, the TF-WQ was challenged to assess the water quality across the Euphrates-Tigris basin, how it is affected by anthropogenic activities and factors (agriculture, urbanization, industry), and the possible impacts of the water quality (particularly salinization and nitrification) on health and the environment.
4. **TF-AWP: Agricultural Water Productivity:** Recognising that water, and not land, was the key constraint to production, TF-AWP, led by ICARDA, sought a strategy to maximise agricultural production per unit of land, optimising the efficient use of water. This would enhance food security in each country and, through regional and bilateral cooperation, lead to a more equitable allocation and use of the resource.
5. **TF-M: Marshlands:** Led by AUB, the objective of the TF-M was to identify the main factors leading to marshland degradation, determine the impacts of marshland loss, and devise solutions to ensure successful restoration.
6. **TF-S: Socioeconomics:** Led by SIWI, the objective of the TF-S was to assess the overall socioeconomic status within the Euphrates-Tigris Basin as applied to related macroeconomic, microeconomic, sustainable development, and social indicators.

APPROACHES AND ACHIEVEMENTS

CPET succeeded in bringing experts from the three riparian countries (Turkey, Syria, and Iraq) to work together to understand and address the challenges

that face transboundary water management within the Euphrates-Tigris basin. A minor part of the basin lies in Iran, and this country was not deeply involved in this study. CPET provided a neutral scientific platform supported by international experts (Implementing Partners) that has enabled the country partners to work transparently and exchange knowledge.

The dialogue among riparian countries was achieved through several meetings, workshops, and capacity building programmes implemented through CPET. National experts were exposed to new technologies that provide a transparent analysis of water resources both nationally and at the basin level. These include satellite remote sensing, modelling complex water-energy-food systems, climate change predictions following various emission scenarios, and the integration of the concept of water productivity. Equally important were the dialogues on the socio-economic aspects within the study region facilitated through the project. These technologies and methodologies are critical to ensuring data-driven and science-based practices are employed for basin management. The participating Country Partner experts have demonstrated every intent in continuing to use and apply these technologies in their respective institutions.

CPET aimed to collect and share national data sets on the water resources in the targeted basins in order to promote water diplomacy and build trust. Ensuring that the different stakeholders agree on a common set of data and statistics has been an important step towards diffusing the water-related conflicts and disputes in the area. The project has created a unified set of data and consistent information for the entire Euphrates-Tigris region. The progress made by this project with regards to establishing a data sharing platform is an important outcome of CPET and it is of utmost importance that the established collaboration is nurtured and supported. Additionally, the experts had the opportunity to meet and collaborate with their counterparts in the other riparian countries. International cooperation between the riparian countries is a necessity if further deterioration of the ecosystem is to be avoided, and if the well-being of the people residing in the project area and beyond is to be increased.

CPET has been successful in getting the riparian countries within the Euphrates-Tigris basin to share knowledge and best-practices on their strategies for water management. On-going regional conflicts have had major socio-economic impacts. Governance, science, the environment, and the monitoring and management of natural resources have all been affected. The impartial and neutral forum provided by CPET, with the support of Sida, has been fundamental in bringing the countries together to share data, provide direction for regional development under the ethic of shared rivers, and facilitate the building of foundations that would support collaborative research in the future.

OUTPUT REPORTS

These Task Forces produced the following output reports:

- **Agricultural Water Productivity** (TF – AWP)
- **Hydrology and Climate Change** (TF – HCC)
- **Socioeconomic Status of Euphrates Tigris Region** (TF – S)
- **Marshland Task Force report** (TF – M)
- **Renewable energy potential and development in the ET Region** (TF– E)
- **LEAP Model for the Euphrates-Tigris River Basin** (TF - E)
- **Water Quality and Salinity Report** (TF – WQ)

The ICBA produced a final report: *Synthesis Report*. Each output report is accompanied by a Policy Brief.

POLICY NOTES AND RECOMMENDATIONS

Agricultural Water Productivity

Irrigation water is inadequately managed in several parts of the basin and optimal yields are not achieved despite the use of large volumes of water. However, there are sites where the yield is optimal and policy makers are encouraged to learn from these and to develop plans to increase overall crop production. Proposals include a survey of crop practices, as well as the introduction of drought and salt tolerant crops. Further cooperation between the riparian countries in the Euphrates-Tigris basin would substantially increase shared water use benefits at lower cost.

Hydrology and Climate Change

Climate change will have an adverse effect on available water resources in the Euphrates-Tigris Basin. Increased headwater snowmelt will affect storage and increasing temperatures will result in a decrease in runoff and increase in demand. Modelling tools provide the opportunity to best assess current

and changing conditions. The use of the Swedish HYPE Model has been agreed to by all partners. This model has been set up and used for representative catchments. More use can be made of the model, including evaluations of irrigation systems for equity, flexibility, reliability, and productivity, as well as an evaluation of drainage systems for total dissolved solids (TDS) loads, water logging, and impacts on groundwater tables. A basic system for water accounting and reporting of annual and monthly water balances is required for every country. The water scarcity map for the period 2015 – 2025 needs to be updated.

Socioeconomics and Gender

Poverty reduction should be considered in all development plans in the riparian countries, particularly for rural areas where higher level of poverty, as noticed from the very limited accessible data on poverty. Poverty levels also varies across the riparian countries, this should motivate more regional collaboration among the riparian countries to reduce poverty. Proper water governance requires the utmost attention to achieve sustainability. Water scarcity exacerbates rural poverty, making communities more vulnerable to migration and ultimately affecting regional stability and growth. The status of women and the achievement of gender equity needs to be at the forefront of all research, management and policy development. Women must be involved in multi-disciplinary stakeholder consultations on land and water disputes. There are promising indicators of progress towards gender equity.

Restoration of the Marshlands

There has been a degree of success in restoring at least some of the Iraqi Marshlands which originally covered more than 20,000 km^2 in the lower Euphrates-Tigris basin. The surviving and restored marshlands (now approximately 5,600 km^2 in extent) are home to a unique society and way of life and a world heritage site of great international significance, particularly for bird migrations. Declining river flows and worsening water quality (especially, but not limited to, TDS) are critical to marshland restoration. Restoration plans must be linked with water allocation plans across the Basin (i.e. agricultural, industrial, and domestic water supply). Monitoring and research are needed to better understand impacts. Discussions with the Iranian government could lead to improved flows from the Karun and Karkheh rivers reaching the marshlands and the Shatt al Arab. The socioeconomic wellbeing of the marsh people needs more attention - with a focus on education, employment, agricultural techniques, and the status of women.

Hydropower, renewable energy potential and development

The riparian countries are committed to developing renewable energy and to the COP 21 goal of reducing their reliance on fossil fuels. Hydropower development in the Euphrates-Tigris basin needs planning of at the highest political level, as water released needs to be timed such that it can serve agricultural, urban, industrial, and environmental goals. Turkey has had the greatest opportunity to develop hydropower. Iraq has some potential; Syria very little. However, while hydropower is an important source of base-load energy, most opportunities for hydropower have already been exploited. Its real value lies as a balancing power for other renewables, with pumped storage schemes playing an increasing role. It is recommended that hydropower be used in tandem with other renewable energy sources, like solar and wind. There are high potential sites for solar power that can be exploited; there is substantial development, and further potential, for wind power generation along the coast. Continued investment in solar and wind capacity is required. Moreover, the integrated use of renewables would require certain infrastructural adaptations; the use of hydroelectric energy as a source of peaking and balancing power, particularly at a regional and trans-boundary level, requires both enough upstream and downstream storage and a well-managed operations plan. Grid connectivity is essential; a cooperative energy-sharing grid that optimises the use of renewable energy to be shared throughout the basin is recommended. This would also mitigate the challenges associated with energy supply security in relation to intermittent renewables. The region should opt for closer cooperation and the development of a joint power pool.

Water Quality

The current CPET programme sought to cover the two most urgent aspects of water quality. The basin has an age-old history of water quality deterioration caused primarily by the leaching of irrigation water. Polluted return flows with varied loading of TDS are a major constraint on downstream users, including the environment. Alongside TDS, the CPET water quality studies focused on nitrate pollution. Conditions worsen as one moves downstream towards the Gulf. Upstream development and increased midstream

water use gradually reduce the water flowing downstream, thus lessening the capacity of the system to dilute contaminants. These anthropogenic factors are exacerbated by environmental and climatic conditions that predispose the region to aridity and salinization. Improved management is critical to maintaining potable and usable water in the basin. With projected population growth and socioeconomic development, demands on the basin water resources may increase; infrastructure for the improved treatment of wastewater will become even more crucial. However, the lack of trusted water quality data has hampered understanding of the current patterns in the basin. More water quality data is needed with more data sharing initiatives between the riparian countries. The procurement and analysis of data on other water contaminants would be recommended in the future. Finally, acceptable water quality standards for different uses still need to be defined and agreed to across the entire basin.

OPPORTUNITIES FOR FURTHER PROGRAMMING

The CPET has laid a foundation for improved water resources management based on the current situation in the Euphrates-Tigris region. There is much more that still needs to be addressed; there is a unique opportunity to build on the collaboration achieved between the country partners. In addition to the many recommendations made in task force and country reports these are some of the areas that can be explored in greater depth in future programme activity.

Water Allocation to user sectors and water balance

Focus on how to share water equitably between people (urban vs. domestic, basic human needs, etc.), agriculture, industry, and the environment.

The value (both social and economic) of water to different sectors (urban, industrial, agricultural, environmental) needs to be debated – and allocations with updated water balance considered. Should irrigated agriculture be allocated more water? How can further abstractions be controlled, licenced, allocated between countries, etc.? National policies need to be aligned to maximize benefits from these trade-offs.

Strategic Water Source Areas

Watershed protection, with catchments as key source areas for downstream users

Partners should give attention to the strategic importance of mountains as water source areas. This requires a sound knowledge base on, inter alia, rainfall and runoff dynamics, land use practices, evaporation and evapotranspiration, and groundwater recharge.

Dams and Reservoirs

Storage and climate change – evaluating water availability and the positive and negative impacts of dams

Storage offers available yield and certain assurances of supply; the greater the variability in rainfall (input), the more storage required to compensate for that variability and offer an annual guaranteed (e.g. to 98%) volume that it can deliver. The impacts of dams (for both irrigation and hydropower) can have positive and negative impacts on users and the environment. Future dams need careful evaluation.

Water Use for Hydropower

Impacts and importance of hydropower generation – operating rules

Reservoirs contribute not only to evaporative losses but also have large environmental impacts both through natural habitat destroyed and through the regulation of flow regimes. This will affect seasonality of flows and the occurrence of natural floods – for better or for worse. Hydropower is least disruptive if it operates off run-of-river, as this does not significantly regulate flow. If, however, water is released because it is needed primarily to generate power, and not when needed by the river to support the environment, agriculture, or the needs of people downstream, then this release could be lost to use – and becomes a consumptive use. Given that the Euphrates-Tigris is close to being a “closed system,” this may not be a serious issue. However, these considerations should be acknowledged and planned for when designing operating rules.

Return Flows

More work needs to be done on both understanding return flows and on quantifying their volumes.

Most ‘non-consumed’ flow is currently assumed to be returning and recycled through the system, which may not be entirely factual. While return flows are significant in volume, the losses of usable water to drainage, evapotranspiration (including from natural but non-productive vegetation), and pollution need to be quantified. It is necessary to prove or disprove the quantification and assumptions regarding return flows.

Agriculture and Food Production

A critical area of future research would be to ascertain who and what farming systems provide the best yields

(highest agricultural water potential), and then how this can be applied to the small grower / rural peasantry.

Major increases in crop yields and agricultural productivity in the basin are believed possible, with research suggesting a possible tripling of crop yield, but need to be demonstrated in practice. Research is needed to determine the most effectives ways to increase yields – through policy, fertiliser, irrigation, site suitability matching, mechanisation, farm size, etc. The proposed "modernisation of agriculture" could be interpreted as meaning "large scale and mechanised," when in practice, small-scale growers often do as well or better than large scale farming. There is a clear need for improvements and advancements in farming systems, such as drip irrigation, fertigation, etc. for both small and large growers.

Irrigation Water Use and Water Use Efficiency

Research to optimise agricultural production with an increase in water available to the system and downstream users, lower return flows, and less salinization

The value (both social and economic) of water to different sectors (urban, industrial, agricultural, environmental) needs to be debated – and allocations with updated water balance considered in this light. Should irrigated agriculture be allocated any more water? How can further abstractions be controlled, licenced, allocated between countries, etc? National policies need to be aligned.

Irrigation Water Use and Water Use Efficiency

Research to optimise agricultural production with an increase in water available to the system and downstream users, lower return flows, and less salinization

Water Use Efficiency (WUE) can either mean producing the same amount of crops using less water or producing more crops using the same volume of water. Irrigation efficiency depends on how water is applied. This needs to be assessed – flood, centre pivot, overhead sprinkler, micro sprayers, drip – with the information providing a key indicator on how to improve WUE. Efficient water application means less leaching - which also means less salinization, and lower return flows. Water thus saved could then be left for downstream users (including the environment). Research should also include the use of water efficient crops, site species matching (to optimise productivity), the use of virtual water (where it is preferable not to farm at all, recognising the value of the water but to import water through crops grown elsewhere under rainfed conditions). A distinction should be made between "desired system use" (e.g. water needed by reedbeds and other riparian vegetation) and "wasted use" (where water is lost without providing system benefit).

Water Use by Rainfed Crops

Additional water use through vegetation change (to rainfed trees or crops) could be an important to study.

How much of the water used by rainfed crops is additional water used over and above the water that would have been used by the natural environment in which the crops have been planted? In other words – how much has the streamflow / river flow been reduced by the planting of rainfed crops? (This applies to plantation forestry that, for example, replaces grassland and uses more water than the grassland, thus becoming a "streamflow reduction activity"). Rainfed agriculture is seldom recognised as a "streamflow reduction activity," although the growth of some crops may function as such. Some crop may deliver more water than the natural vegetation replaced; understanding these dynamics is crucial to identifying crops suitable for cultivation in the basin.

Environmental Water Use and Ecosystem Services

Explore ecosystem services, the rights of the natural environment, and water quantity and quality requirements for sustainability.

For naturally forested catchments, the water use by these trees would always have been part of the system and would have been accounted for in determining the natural runoff in the basin. Destroying the forests might add some additional water to the system, but at a possibly extreme cost in quality and seasonality of flows. Should forested areas not be natural but comprise extensive plantations of trees grown for timber within, for example, grassland catchments – then these should be seen as agricultural crops (and a streamflow reduction activity, as discussed under agriculture above). Natural forests provide ecosystem services – and we should value the water used in maintaining these ecosystem services, rather than determining their water use as "consumption". The above arguments apply equally to the marshlands. As a downstream ecosystem the services of the marshlands have been easier to undervalue. Lakes and reservoirs do evaporate water, as does all vegetation (which is also essential in reducing surface runoff and encouraging recharge to groundwater).

Wastewater Treatment

A programme is required to research pollution from treatment plants and to ensure that measures are introduced to monitor and address default situations.

Wastewater treatment is essential to downstream water quality and health. While often a major problem this is one of the easier point sources of pollution to deal with - requiring adequate wastewater treatment works that keep pace with growing populations, a dedicated budget, and dedicated management. The setting of high standards for effluent releases and the monitoring of the effectiveness of wastewater treatment is critical across the basin

Other point sources of Pollution

Research national policies on wastewater discharge and how these discharges are controlled.

Industry has been noted throughout the CPET study as a major source of pollution. This points to a need for improved regulations and enforcement to control polluters. Work needs to be done on the assimilative capacities of the Euphrates and the Tigris and whether there is too much reliance on dilution. Wastewater discharge charges need to be determined and enforced, so that polluters are forced to improve their internal practices.

Policy in an International Context

Place water use by the countries sharing the Euphrates-Tigris Basin in the context of international obligations.

In the future, countries should review the situation within the Euphrates-Tigris basin in the light of other international agreements and protocols enacted in other parts of the world regarding the sharing of rivers. This would not only be to gain from lessons learned but also to share the positive experiences of the country partners.

Basin governance, management and investment

There will be a need to outline the regional governance structure and dispute resolution mechanisms and processes to be used as an essential function of the latter, given that the establishment of an institution or organisation does not necessarily eliminate the potential for disputes to arise. Ensure that such structures are transparent, open and accessible to all groups regardless of gender, socioeconomic status or other vulnerability factors. An integrated, inclusive investment program for the Euphrates and Tigris basin, which includes opportunities in agriculture and rural development, livelihoods and food security, marketing, and restoration of salinized areas and marshlands should be considered. The program will take into consideration the roles, priorities, challenges and opportunities for women (including women-owned businesses, women-led initiatives, female heads of households), youths, and vulnerable or marginalized groups.

CONCLUSIONS AND FINAL REMARKS

The Collaborative Programme on the Euphrates and Tigris has successfully accomplished numerous feats during its run. The aim of the project was to facilitate dialogue between relevant stakeholders and generate data and knowledge about the water use dynamics in the basin. Though the project was constrained by several factors during the execution of the project, overall, much progress has been made on the objectives and goals outlined during its inception phase.

Since 2013, the project had conducted numerous capacity building exercises, meetings, presentation, and collaborative exercises that have allowed for participants from across the riparian basins to share best practices with each other and exchange knowledge with implementing partners with an expertise on water management. Moreover, at the end of the project, unprecedented amounts of data have been exchanged, compiled, analysed, documented, and reported on in the taskforce reports, policy briefs, maps, and miscellaneous outputs from the project.

The findings of the project, though varied and interdisciplinary, demonstrated the importance of the Euphrates-Tigris resource. Its cultural, economic, social, historical, environmental, agricultural, and industrial significance for the communities reliant on it cannot be underestimated. However, the Euphrates-Tigris basin is increasing strained by the demands of human development and the increasing impacts of climate change. Going forward, collaborative transboundary management will be vital to ensuring the longevity and prosperity of the basin for decades to come.