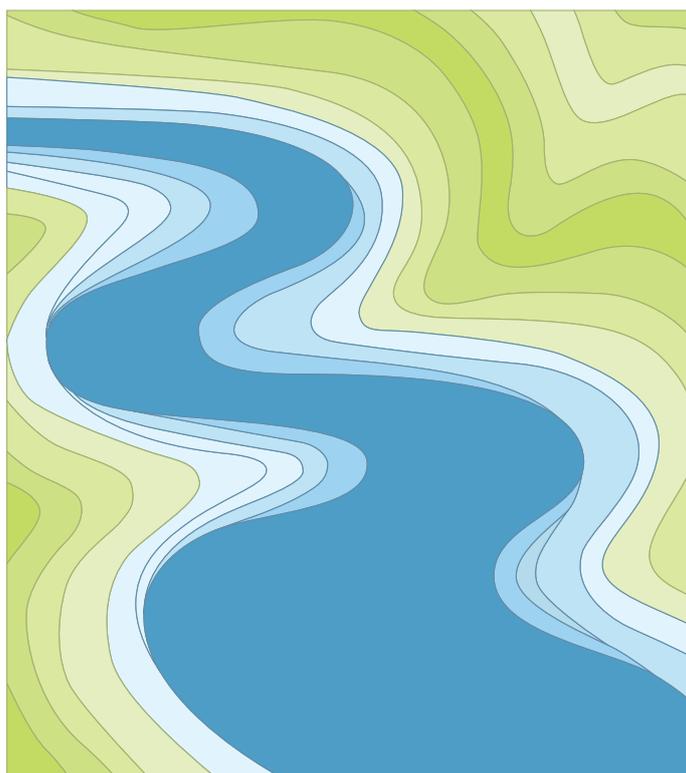


# **BENEFITS OF COOPERATION**

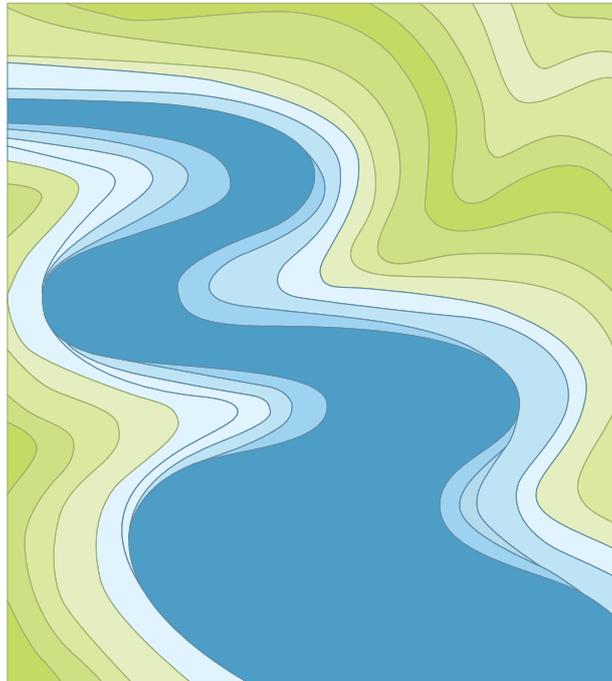
IN THE MIDDLE EAST





# **BENEFITS OF COOPERATION**

## IN THE MIDDLE EAST





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## FOREWORD

This publication is about what could be possible if the countries in the Middle East would prioritise peace and development over conflict and antagonism. It may appear unrealistic at a time when the internal conflict in Syria is internationalised and refugee camps strain the economies of Iraq, Jordan, Lebanon and Turkey. It may appear ironic on the background of political instability, reflected in the long time taken to form governments in Iraq and Lebanon following the elections held in the summer of 2018. Its focus on cooperation and common good may appear Utopian, when a sectarian conflict has torn apart the entire Middle East.

Strategic Foresight Group is aware of the violence and stress that the Middle East is facing at the end of 2018. However, no conflict lasts forever. Even the World Wars saw their end, and some of the long standing conflicts such as between South and North Korea and between Ethiopia and Eritrea were concluded in the current year. Therefore, it is but natural that someday the conflicts in the Middle East will be over and post conflict reconstruction will begin. We absolutely need a vision for the day after so that a region coming out of violence does not relapse into it again. Such a vision has to promote mutual inter-dependence and harness resources in the Middle East in the best interest of all the people, despite where they live and which religions or sects they belong to.

This brief report is an outline of what could be possible once the conflict is over. It is not a blueprint. It is merely a milestone to show the direction. Therefore, it is proposed as a document for discussion. We expect that experts in the Middle East will use the framework to take clues from some of the ideas and develop a comprehensive and realistic plan of action for rebuilding the Middle East in the spirit of peace and cooperation.

This paper has resulted as much from research, as from consultations in the context of the Blue Peace Initiative in the Middle East. We are grateful to scores of leaders and experts from the region, whose wisdom has guided us to shape some of the ideas presented here. We are also grateful to the Swiss Agency for Development and Cooperation for their consistent support for the Blue Peace process for almost a decade. However, the responsibility for the contents is only ours.

We hope that at time when the minds in the Middle East are tired of pessimism forced by the crisis of today, this report will provide fresh thoughts to reimagine the construction of tomorrow.

**SUNDEEP WASLEKAR**  
President

**November 2018**



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# Introduction

In 2011, Strategic Foresight Group published a landmark report highlighting the benefits of cooperating over shared water resources in the Middle East. ‘The Blue Peace: Rethinking Middle East Water’, contained a number of recommendations which were made to the countries in the region. These recommendations were intended to improve collaboration and cooperation over the management of shared water resources – actions that would build strength in the region, and ultimately, accrue peace.

Among the recommendations was the formation of a Cooperation Council for Water Resources in the Middle East. The Council was intended to undertake a number of functions, including but not limited to:

- ≡ evolving a consensus on principles of cooperation
  - ≡ creating regional agreements, guidelines and practical measures for standardising measurements of quality and quantity of water resources
  - ≡ developing specific means of combating climate change and drought in a collaborative manner
-

- ≡ facilitating negotiation and creation of joint projects at basin or regional level including common early warning and disaster management systems
- ≡ preparing the ground for integrated water resource management at the basin level.

In the years since the publication of the report, the Middle East region has undergone major changes, several of which have a significant impact on water. The dynamics between countries have shifted in numerous ways. Where previously Syria was a key participant in regional dialogues, the conflict has made the country difficult to engage with. On the other hand it has become possible in the recent years to engage more with Iran on the issue of shared water resources. In fact, a key conclusion of a High Level Forum for Blue Peace in the Middle East held in October 2015 in Geneva was that it would be useful to engage Iran in the Blue Peace Process. Participants at the meeting felt that while it had not been possible previously to engage with Iran due to geo-political and practical constraints, the changing landscape meant that there was potential for a future engagement.

The Middle East is amongst the most water stressed regions in the world, while also playing host to a number of conflicts. These issues disproportionately affect the most vulnerable people in these countries – women, children and refugees. As we will address in this report, cooperating over water can also alleviate a number of other issues and generate benefits, such as livelihoods, energy and food security.

Despite a changing landscape, these countries can still generate benefits by cooperating over their shared water resources. These benefits have been derived from the original vision of the Cooperation Council and its proposed functions.

Before outlining what these benefits are, it is important to consider what is meant here by the word ‘benefit’, especially in the context of water cooperation. In this context, benefits of water cooperation involve a scenario in which parties gain and exchange benefits under the following circumstances:

- ≡ All parties gain (win – win)
- ≡ Benefits are exchanged (surpluses and deficiencies of different countries are matched)
- ≡ Benefits are equal but not necessarily equivalent (trade-offs can be water for food,

or water for energy, or hydropower for security, or knowledge for technology and so on)

- ≡ The benefits promote socio-economic development – jobs, energy, food security, health security, ecosystem protection
- ≡ The benefits make vulnerable communities in the countries more resilient
- ≡ And ultimately, the benefits build peace in the Middle East region.

These benefits are contingent on active cooperation amongst the countries in the region. It is evident that many of the countries – i.e. Iraq, Iran, Jordan, Lebanon, Turkey and Syria – are willing and able to cooperate on a bilateral basis on the issue of shared water resources. Regional cooperation has been absent.

However, the need of the hour, and the purpose of Blue Peace in the Middle East, has been broader cooperation over the water resources across the region. The countries have previously shown themselves willing to think along regional lines. In June 2010, relations between Jordan, Lebanon, Iraq, Syria and Turkey were very strong. At the time, Jordan Lebanon, Syria and Turkey formed a Quadrilateral Free Trade Area. This covered cooperation in energy, trade, transit and industry. The region experienced fast integration of their trade and economies. However, with the crisis in Syria in early 2011, the experiment collapsed.

It is imperative for the countries to reshape their visions towards such a mind-set once more. This report, 'Benefits of Cooperation in the Middle East' is an endeavour to help nations in the region to ensure this change in attitude by recognising the enormous advantages in terms of socio-economic development, as well as peace and security, that can be attained as a result of transboundary cooperation.

Cooperation in the area of hydropower and irrigation has the biggest potential for benefits. This report will demonstrate that joint dam projects and the dams located in the border areas have a collective hydropower potential of 1400-1600 MW and water to irrigate thousands of hectares of land, which can improve the lives of around 32-35 million people living in the basin areas of the riparian countries. Around 80% of total irrigated land in Turkey, Syria, Iraq, Iran, Lebanon and Jordan (which totals to almost 18 million hectares) is still irrigated using traditional irrigation systems, causing water

loss of 35-60%. Switching to modern irrigation techniques can reduce water loss in the region by 5-20%.

Jordan, Syria, Turkey, Iraq and Iran can gain from engaging in intra-regional trade to fulfill its food import which, at present, stands at 50% of its total food requirement. Regional cooperation on protection of water infrastructure can improve the countries' resilience which can help in post conflict reconstruction, especially in Iraq and Syria. Regional cooperation also has the potential to improve countries' capacity to monitor and better manage the impacts of the multiple droughts faced by these countries. Ecosystem protection measures can also provide enormous benefits; the regeneration of marshlands in the Tigris-Euphrates basin can help 500,000 Marsh Arabs and generate a potential income of USD 3.4 billion and establishing a community-based conservation process could offer resilience during conflicts and provide tangible benefits to the local population.

The countries in the region will stand to achieve all these benefits and more, if the functions of the Cooperation Council can be replicated or implemented at present in any shape or form. The path for cooperation, as well as the benefits, has been laid out and the political will to take the process forward is the need of the hour.

# Chapter I

## Hydropower

### I. Benefits of Continuing Collaborative Dam Projects

- ≡ If the countries were to continue to collaborate on the joint dam projects as detailed on page 6, it could lead to the generation of approximately 200-250 megawatts (MW) of hydropower and irrigate about 15,000-20,000 hectares (ha) of agricultural land in Turkey, Syria, Lebanon, Jordan and Iraq collectively, ultimately benefiting around 9-11 million people living in the shared river basins of the Orontes, Yarmouk and Great Zab Rivers wherein these projects are being or have been undertaken.
-

## Benefits of Cooperation

### Joint Dam Project

Status

River

- Countries
- Hydropower Potential
- Irrigation Potential
- Basin Population

### Syria-Turkey Asi Friendship Dam

Construction started in 2011 but currently halted due to the Syrian crisis

Asi/Orontes

- Syria and Turkey
- 8.9 MW
- 8,000 ha
- 5.8 million

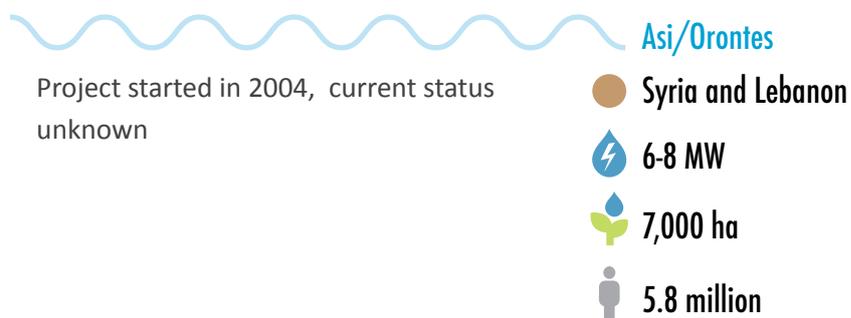
### Al Wehda Dam/ Unity Dam

Constructed based on provisions of 1987 Agreement, construction completed in 2007. Flow of river towards the dam has increased since 2013 compared to 2011 due to migration in Syria. No evidence of recent cooperation between the riparian countries on the usage of the dam's resources.

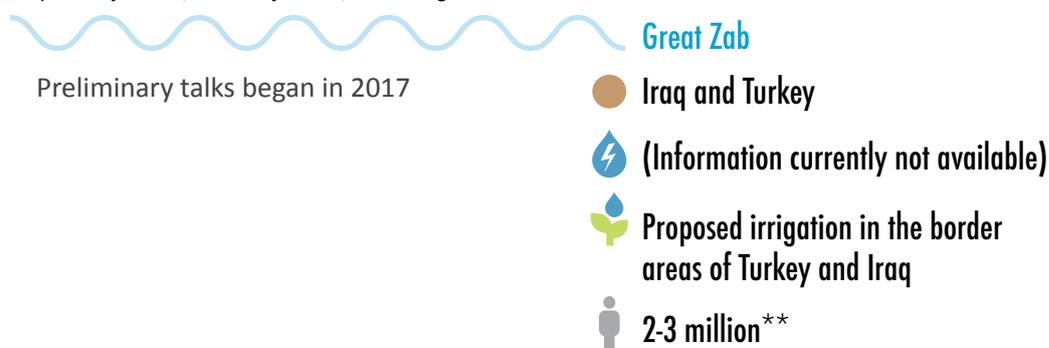
Yarmouk

- Jordan and Syria
- 200 MW
- 30 million cubic meters of water for agriculture
- 2-3 million\*

## El Aassi Dam



## Küçük Zap Dam, Hacıbey Dam, Karadağ Dam



## Total Benefit of Cooperation



\* Note: Exact population of the Yarmouk river basin is unavailable, population calculated here on the basis of persons residing in the Jordanian governorates through which the river flows.

\*\* Note: Exact population of Great Zab river basin is unavailable, population calculated here on the basis of the persons residing in the Iraqi governorates and Turkish provinces through which the river flows.

## II. Benefits of Collaboration on Other Dam Projects

- If the riparian countries were to collaborate on the projects being constructed on the borders of countries, as detailed below, the potential hydropower of 1200-1400 MW that the dams could generate and the potential irrigation capacity of the dams which could be shared, could ultimately benefit approximately 23-24 million people living in the Tigris river basins and the marshes area collectively.

### Potential Benefits of Cooperation

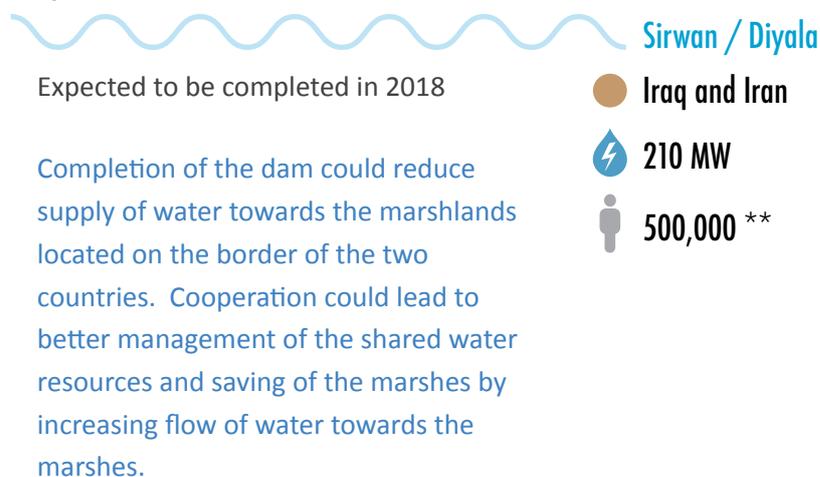
#### Candidates for Cooperation

|                    |                                    |
|--------------------|------------------------------------|
| Status             | River                              |
| Cooperation Impact | Riparian Countries                 |
|                    | Hydropower Potential               |
|                    | Potentially Benefitting Population |

#### Ilisu Dam

|   |   |
|---|---|
| Impounding of the dam was to begin at the start of 2018 but has been delayed by Turkey upon the request of Iraq   | Tigris  |
| Completion of dam could lead to loss of flow of the river water towards lower riparians. Cooperation between countries such as an agreement detailing a schedule prepared by Turkey with the other riparian countries for releasing the water of the dam could positively impact the flow of the river and benefit the lower riparian countries. Turkey and Iraq have already entered into an agreement to allow for the flow of a minimum of 90m <sup>3</sup> /sec of water towards Iraq during impoundment of the dam and similar cooperation can continue, benefitting all the riparian countries. | Turkey, Iraq, Iran and Syria (The dam is being built close to the border of Turkey and Syria) |
|   | 1200 MW   |
|   | 23.4 million *  |

## Daryan Dam



## Total Potential Benefit of Cooperation



\* Note: This shows the population of the people residing in the Tigris River basin.

\*\* Note: This shows the population of the people residing in the area of the marshlands.

## III. Benefits of Creation of a Regional Electricity Grid

- ≡ Turkey has a huge hydropower potential, especially since the launch of the South-eastern Anatolia Project (GAP). The current hydropower installed capacity of Turkey is 25.9 gigawatts (GW), as compared to Iran which has hydropower installed capacity of 11.2 GW or Syria which has around 1.51 GW.
- ≡ Additionally, in terms of total electricity capacity, Iran and Turkey have amongst the highest capacities in the Middle East region along with Saudi Arabia and Egypt.
- ≡ In 2010, Jordan, Lebanon, Syria and Turkey agreed to enter into an agreement to form a Quadrilateral Free Trade Area. The agreement was intended to establish a

cooperative relation among these countries on various matters including energy trade. The collaboration failed due to the 2011 Syrian crisis. However, it succeeded in showcasing that collaboration in this region was a possibility and the governments of these countries were open to having dialogues on internal trade.

- ≡ Currently, there are few power grids already in existence in this region, including the electric grid project of Egypt, Iraq, Jordan, Lebanon, Syria and Turkey (EIJLST). Post joining of Libya and Palestine, the EIJLST became the Eight Country Interconnection Project (renamed EIJLLPST).
- ≡ The EIJLLPST is much needed as the electricity demand in these countries has been on the rise.
- ≡ Although the project is operational, possibly due to recent events in the region, the interconnection of the Iraqi grid with the Syrian and Turkish grids in the EIJLLPST project is yet to be completed.
- ≡ Syria's electricity generation dropped by more than half from 2010 to 2014 due to the on-going conflict in the region. Therefore, Syria has entered into various agreements and memorandums of understanding (MoUs) with Iran to repair the power grid of the country. The two countries are also in discussion to have Iran export electricity to Syria by connecting Iran's national grid to the national grids of both Iraq and Lebanon.
- ≡ Since there are already power grid projects and discussions in the region on trading of electricity, there is a scope for establishing a regional grid amongst Iraq, Iran, Syria, Jordan, Lebanon and Turkey. The countries could collaborate to set up a regional electricity grid to share the hydroelectricity generated by the dams between the riparian countries.
- ≡ This regional electricity grid project could serve as a platform to improve cooperation between the countries as the setting up of the electricity grid would require government-to-government cooperation for establishing the legal, economic and organisational aspects of electricity trading.

# Chapter II

## Irrigation

### I. Minimization of Agricultural Loss through Exchange of Technology and Know-how

☰ Below is the total irrigated land (in hectares/ha) of each of the countries.




---

**Total : 17.96 million ha**

- ≡ Jordan has implemented modern irrigation systems such as drip-irrigation and sprinkler irrigation in 82% of its irrigated land, resulting in higher agricultural outputs.
- ≡ In Turkey, overall 19% of the irrigated land is irrigated using modern irrigation systems and the remaining land is irrigated using surface irrigation. However, in the Mediterranean regions and the regions of Bursa, Edirne and Kayseri in Turkey, sprinkler irrigation and drip irrigation systems are more widely used.
- ≡ Turkey has also implemented over 300 drip irrigation projects between 2006 and 2011 with the support of the World Bank.
- ≡ Similarly, Iran has implemented drip irrigation in some parts, resulting in irrigation of more than 1.5 million ha of Iranian farmland out of the total of 7.5 million ha irrigated land.
- ≡ In Syria, 80% of the irrigated land is irrigated using traditional surface irrigation methods. The government started an initiative in late 2000 to introduce modern irrigation techniques over a period of 10 years. However, there is no updated information available on the implementation of modern techniques in Syria, possibly due to the on-going crisis.
- ≡ In Lebanon, surface irrigation is widely practiced; though around 21,000 ha of the total of 139,746 ha irrigated land has been irrigated using sprinklers.
- ≡ In Iraq, around 3.3 million ha of land is under surface irrigation which is a majority of the total 3.8 million ha of irrigated land.
- ≡ Irrigation efficiency in Iran, Syria, Iraq and Lebanon has been shown to be low, on an average between 30-45%, which could be increased through the implementation of modern irrigation systems.
- ≡ Additionally, water loss from surface irrigation is 35-60% and water loss from drip irrigation is minimal at about 5-20%. Therefore, with the incorporation of modern irrigation systems, water loss in irrigation could be reduced by 30-50% in these countries.
- ≡ Turkey and Jordan, having the technical know-how, could assist Iraq, Iran, Syria

and Lebanon through exchange of data, provision of subsidized equipment such as pipes, and provision of training to the farmers on how and when to use pressurized irrigation systems.

- ≡ **In the past the countries have made attempts to cooperate. For example, in 2001, Turkey and Syria had signed a Joint Communiqué for supporting training, technology exchange, study missions, and joint projects between the two nations. Similar arrangements can be implemented between the countries for improving their agricultural practices and minimising irrigation losses.**

## II. Improving Quality of Water through Wastewater Treatment

- ≡ The agricultural sector consumes around 70-90% of the overall water resources in these countries. Therefore, one of the best and most cost effective way to provide water for agricultural use is to treat the wastewater generated in these countries.
- ≡ The International Center for Biosaline Agriculture (ICBA) considers treated wastewater as an important alternative water resource. Wastewater reuse can also increase agricultural production in regions experiencing water shortages thereby leading to food security.
- ≡ Furthermore, wastewater use in agriculture can also be cost effective as it eliminates the cost of pumping groundwater resources which represents approximately 65% of the cost of irrigation activities.
- ≡ Water quality is improved as a result of treatment of wastewater since it reduces the risk of pathogen exposure and improves the health of agricultural workers.
- ≡ The World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and the Environmental Protection Agency (EPA) have developed several guidelines detailing the parameters for toxicity and effluents that may be present in treated wastewater used for agricultural/irrigation purposes. The countries can use these guidelines to strengthen their laws/policies on wastewater treatment and the quality of treated wastewater that could be used for agricultural/irrigation purposes.

- ☰ Treatment of wastewater also improves the quality of river water and prevents water pollution since there is a reduction in the discharge of untreated wastewater into the rivers.
- ☰ Below is the number of wastewater treatment plants in each of the countries:



- ☰ In 2016, out of the 4.5 billion cubic meter of wastewater discharged in Turkey, 3.8 billion cubic metres was treated in wastewater treatment plants. Also as per data from 2016, 70.2% of Turkish population is connected to wastewater treatment plants.
- ☰ The Ministry of Environment and Urbanization of Turkey has implemented the “Wastewater Treatment Action Plan 2023” which states that the total number of wastewater treatment plants in Turkey shall be increased to 2,154 by 2023.
- ☰ In Jordan, about 63% of the total population has access to wastewater treatment systems, thus, raising the sanitation level, improving public health, and reducing surface and groundwater pollution in the areas served by wastewater facilities. The reuse of the wastewater along with efficiencies in irrigation has allowed for a 30% increase in irrigated land in Jordan during the period between 1994 and 2013.
- ☰ Jordan has also implemented projects on decentralized wastewater treatment by which the costs of wastewater pumping over long distances to large centralized treatments plants are eliminated. One such project has been implemented in Jordan by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in cooperation with the Bremen Overseas Research and Development Association (BORDA).

- ≡ Iraq generates about 580 million cubic metres of treated sewage waste. Aside from the existing wastewater treatment plants, in 2015, Iraq has signed loan agreements with the Japan International Cooperation Agency (JICA) for support to set up additional wastewater treatment facilities.
- ≡ Iran has partnered with a Turkish company to build a wastewater treatment plant in Tehran.
- ≡ Turkey, Jordan and Iran, having the advanced wastewater treatment technology could share the technology and know-how with Lebanon and Syria so as to increase the amount of treated wastewater and ultimately provide more water for agricultural/irrigation purposes in the region. Iraq could, similar to Iran, partner with Turkish companies to build more wastewater treatments plants in the country.

### III. Efficient Water Management and Regional Cooperation through Water Users Associations

- ≡ Water Users Associations (WUAs) are organisations made up of small and large-scale farmers who combine their finances and technical expertise for operation and maintenance of a local water system, such as a river or water basin. It is normally run as a non-profit structure and membership is typically based on contracts and/or agreements between the members and the association.
- ≡ The creation of WUAs can be a successful approach towards management of water resources in the rural areas.
- ≡ WUAs usually have a separate legal status, allowing them to enter into contracts and also have their own governing body. For example, in Turkey, the main decision-making body of a WUA is the Council, which has a four year term, and is composed of the local authorities who are permanent members (such as the village headmen and the mayor) and selected representatives from the villages.
- ≡ The State Hydraulic Works (Devlet Su İşleri - DSI) of Turkey has handed over the operations and maintenance for irrigation systems to the WUAs as of 1993.

- ≡ Additionally, the Turkish government has given technical assistance to WUAs that consists of repair and maintenance of water structures with provision of equipment, training support and guidance on technical and administrative issues.
- ≡ Since the transfer of operation and maintenance to WUAs, irrigation efficiency in Turkey has increased by 10% and energy consumption has decreased leading to saving in energy cost of approximately 25%.
- ≡ In Jordan, there are currently around 22 WUAs in the Jordan Valley, which cover almost 80% of the irrigated area in the valley. The GIZ has also helped to set up WUAs in the valley and trained the farmers to use treated wastewater for irrigation.
- ≡ Setting up of these WUAs in Jordan has led to more efficient and decentralized irrigation water distribution, more stabilized water pressure and water structure, decreased percentage in penalties related to illegal water use and also increased trust and cooperation between the Jordan Valley Associations and farmers.
- ≡ Between 2006 and 2008, JICA conducted training sessions in Iraq on establishing WUAs for efficient irrigation water management.
- ≡ In Syria, the government had adopted a series of policies for the development of water resources, including the establishment of WUAs. However, there is no information available on the current status of the WUAs in the country.
- ≡ In Lebanon, there are some WUAs in the form of agricultural cooperatives that provide various services to farmers in the region. Although, similar to Syria, there is not much information available on what the associations do or how effective they have been.
- ≡ In Iran there are few WUAs that have mainly been set up to manage government-based irrigation projects. However, the unequal distribution of power among the association members has led to failure of such organizations in Iran.
- ≡ **Countries such as Syria, Lebanon and Iran could benefit from organizing WUAs among the farmers. Additionally, these countries could get training from the experts of the WUAs of Jordan and Turkey, similar to the training sessions held by JICA in Iraq and the GIZ in Jordan.**

- There is also a potential for regional cooperation in water resources management through linking of the WUAs in the various countries, thereby setting up a platform for exchange of water related technology and data between the nations.

## IV. Better River Water through Reduction of Salinity

- Water from the Tigris-Euphrates and the Shatt-Al Arab is used to irrigate large portions of land in these regions, as detailed below.



\* Note: Irrigation potential of the Shatt-Al Arab is available only for Iraq.

- Salinity in the river waters in this region is leading to low quality of water for irrigation.
- In general, the recommended limit of salinity in the water for irrigation is 300-600 mg/l. The salinity in the Euphrates River is already at 600 mg/l in the Syrian-Iraqi border and increases to a minimum of 1200 mg/l in Samawah region in Iraq.
- In the Shatt-Al Arab, salt intrusion lengths vary from 38 to 65 km, with a likelihood of increase of up to a distance of 92 km. These predictions demonstrate that the river may face deteriorating water quality levels in the near future.
- Surface-water salinity can be effectively controlled by tackling the major sources of saline water inflows to shared water resources, which would require the coordination of all riparian nations.
- An option for the countries to prevent and mitigate further salinity in the rivers is to adopt water treatment on the sewage and industrial waters, preventing the

wastewater from being discharged into rivers without treatment with the objective of maximizing the volume of good quality water and minimizing the volume of saline water.

## V. Collaboration on Exchange of Data on Shared Water Resources

- ≡ At present, countries in the Middle East monitor their shared water resources on an individual basis. Some countries do exchange data but under specific conditions with neighbours.
- ≡ In June 2014, Iraq and Turkey agreed to exchange quantitative and qualitative data and standards of the flow of the Tigris River. It was proposed that two monitoring stations would be identified near or on the border of the two countries. The Cizre Monitoring Station was identified for this purpose; though, due to the attacks by violent non-state actors in the region, proceeding with this arrangement suffered a setback. However, Turkish and Iraqi officials have stated that they are willing to cooperate in future on the exchange of data on the Tigris River.
- ≡ Joint monitoring of qualitative and quantitative data is considered a high level of cooperation. Taking this idea of cooperation forward, the countries in the region could harmonize standards for collection of quantitative and qualitative data on their shared water resources, including both groundwater and surface water.
- ≡ Turkey, Syria, Iraq, Iran, Jordan and Lebanon could eventually set up multiple joint water monitoring stations to monitor water resources in the Tigris-Euphrates and the other basins in the region.
- ≡ Setting up of the collaborative monitoring stations could assist the countries in better management of shared water resources for the purposes of improved irrigation, food security, protection of water infrastructure and better drought/flood management in the region.

## VI. Benefits of Sustainable Usage of Groundwater for Irrigation

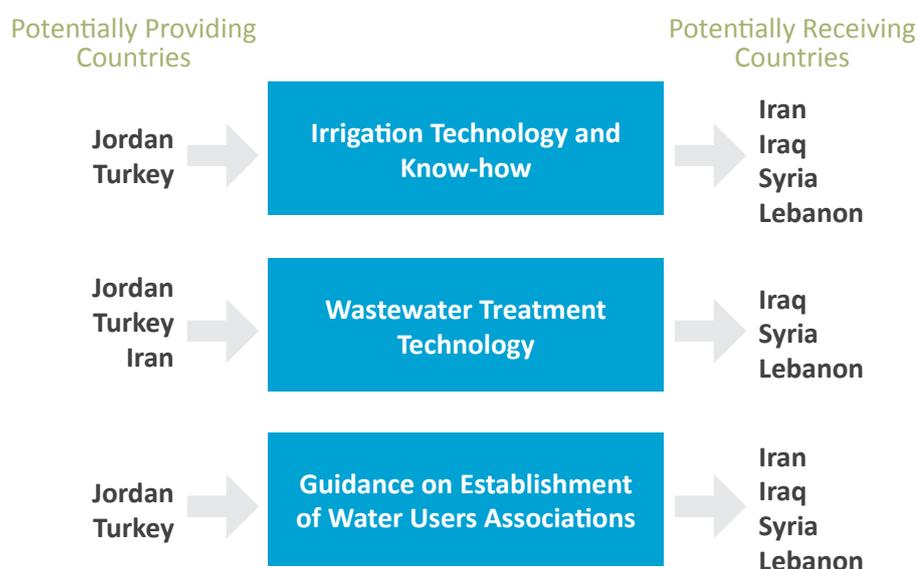
- ≡ As mentioned earlier, agriculture consumes 70-90% of water in these countries, and that includes not only surface water but also groundwater.
- ≡ The Middle East region, being one of the most water-stressed in the world, relies heavily on groundwater for the purposes of irrigation.
- ≡ For example, in Syria, groundwater-based agriculture represents 53% of the total irrigated land. Whereas, in Iran, groundwater is the source for 55-65% of irrigation water supply. Jordan, where groundwater is the major water source, used 237.4 million cubic meters of groundwater for irrigation in 2015, as compared to 139 million cubic meters of surface water used for irrigation in the same year. Therefore, in 2015 in Jordan, 63% of freshwater used for agriculture was groundwater. In Turkey, there are multiple aquifers and the country has incorporated mechanisms to control overexploitation of these aquifers.
- ≡ Additionally, Turkey has also got Groundwater Irrigation Cooperatives since 1966. These cooperatives consist of farmers and are created by the authority of the Agricultural Development Section of the Provincial Administration. The cooperatives are formed by farmers holding lands that are irrigated through groundwater. The DSI in Turkey is responsible for constructing the wells on these lands and are later reimbursed by the cooperatives over a 30 year period (sometimes more). In total, 16% of land irrigated with groundwater in Turkey is irrigated by these cooperatives.
- ≡ Although, groundwater is a large source of water for irrigation in these countries, and the countries share multiple aquifers and groundwater basins, the information regarding these shared aquifers are limited.
- ≡ As per a report published by the United Nations Economic and Social Commission for Western Asia (UNESCWA) in collaboration with the Federal Institute for Geosciences and Natural Resources (BRG), the information on shared aquifer systems in the region is outdated, obsolete, or in some case classified information that the respective ministries of these countries do not share.

- ≡ Furthermore, there are currently no agreements between any of these countries on their shared groundwater/aquifers.
- ≡ As surface water is not a sufficient source of water in these countries, it could be beneficial for Turkey, Iran, Iraq, Syria, Lebanon and Jordan to collaborate on exchanging of data on groundwater so as to monitor groundwater abstraction and limit its overexploitation. Complete mapping of the groundwater sources available in the region can also be undertaken by the countries as a collaborative project.
- ≡ The joint water monitoring stations referred to previously, could monitor not only the surface water but also the shared groundwater basins and aquifers in these countries.
- ≡ Such collaborative projects on groundwater management are already being undertaken on a regional scale. For example, in 2016, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Swiss Agency for Development and Cooperation (SDC) agreed to “undertake research and develop the national capacities for the sustainable management and use of groundwater resources in the Kurdistan Region of Iraq”. However, there is a need to explore the management of shared groundwater resources on a larger scale in order to address the region’s water scarcity problem.

## VII. Regional Framework on Knowledge Partnership for Irrigation Efficiency

- ≡ Although there are currently no regional agreements or treaties amongst the six countries on exchange of irrigation practices or know-how, Turkey has collaborated with the International Centre for Agricultural Research in the Dry Areas (ICARDA) through a MoU signed in 2011 for the development of joint research projects including transfer of technology and capacity development for research institutes. The institute has carried out various projects to improve the agricultural practice and increase water efficiency.
- ≡ Certain countries have the access to technology and could provide assistance and guidance to the other countries on irrigation know-how, wastewater treatment

technology and establishment of WUAs, thereby allowing the governments and farmers of other countries to gain the expertise needed to increase their irrigation efficiency. In this context, Jordan and Turkey have strengths that they can share with the other countries, in return for trade-offs and benefits received in other areas.



- ≡ The countries can mutually benefit by establishing a regional framework on knowledge partnership for gaining overall irrigation efficiency, which could include the following:
  - provisions on developing a knowledge exchange platform where the institutions, representatives, experts and researchers from the Potentially Providing Countries can provide guidance and training sessions for the governments and farmers of the Potentially Receiving Countries (as detailed above);
  - guidelines on regional irrigation practices, such as implementation of modern irrigation methods in basin areas to improve water efficiency;
  - include recommendations on wastewater management to reduce dumping on untreated water into the shared water resources, thereby reducing the salinity levels in the river water; and
  - provisions on the establishment of a regional body that could oversee the implementation of these recommendations and guidelines.

# Chapter III

## Food Security

### I. Change in Crop Varieties to Increase Agricultural Productivity

#### Current practice in the region

Saline-sodic soils constitute a vast area of river basins which results in:

- Stunting of crops
- Nutritional imbalance of crops
- Overall decline in productivity

#### Suggested practice

Growing saline-resistant crops

- Wheat varieties: 'Kavir', 'Bam', 'Sistan'
- Barley: 'ON-4' and 'm81-19'
- Fodder crops: 'Sorghum-KFS4' and 'Speedfed'

### Benefit from the suggested practice

Implementation will result in maximum yield for the following saline river basin:

- Shatt-Al Arab: 78% production dominated by wheat and barley
- Orontes basin: 80% production dominated by barley
- Tigris-Euphrates: 90% dominated by wheat and rice

### Current practice in the region

Water- intensive crops are cultivated in large planted areas

### Suggested practice

Growing less water intensive varieties of crops in smaller planted areas:

- Less water intensive varieties of wheat 'Chamran' and 'Verinak' which give average of 2 T/ha

### Benefit from the suggested practice

Can be useful for the following regions:

- 80% of the Orontes river basin which is dominated by the cultivation of water intensive varieties of rice and wheat
- The average yield of wheat in Iraq side of Karkeh river basin is 1.1 T/ha while the global average is about 2.8 T/ha

## II. Emergency Preparedness through Cooperation on Grain Reserves

- ≡ Through regional coordination, certain crops can be made available to countries facing conflicts and humanitarian emergencies. This could help in alleviating the food crisis that occurs in such situations. FAO predicts that the projected below-average rains between April and August 2018 are likely to impact cereal (wheat and barley) and vegetable production in Syria. Damage to irrigation systems due to conflict could further impact the outcome of winter grains harvest. If a grain

reserve is established with the help of other countries in the region, the impending food crises could be alleviated.

- Below is a list of the top 3 crops grown in countries in the Middle East. Countries can agree to use any of these crops to contribute towards a grain reserve.

**Jordan** — tomatoes, potatoes, cucumbers

**Iran** — wheat, rice, barley

**Iraq** — tomatoes, wheat, barley

**Syria** — maize, barley, wheat

**Lebanon** — barley, rice

**Turkey** — barley, maize, millet

- This can also be applied for situations of seasonal variations. Wheat and barley are the main crops cultivated in Iran. Irrigated wheat covers only one third of the total wheat area, thus the bulk of the wheat crop depends on rainfall. Most of the rain-fed wheat crop is concentrated in the west and north-western regions of the country in very small agricultural land holdings. During periods of low rainfall, Iraq can supply wheat to Iran since wheat is cultivated by irrigation in Iraq. Thus, countries can exchange crops to safeguard themselves against the effects of climate change and seasonal variations.

### III. Climate Change Adaptation Practices in Agriculture

- For 2018, total cereal production in Lebanon has been estimated at about 164000 tonnes, 6% below the harvest of 2017 and the five year average because of below-average rains. FAO has also predicted that Syria and Lebanon shall receive below-average rains in 2018, which will severely impact the production of fruits and vegetables.
- Voluntary National Review (VNR) published annually by Jordan, Lebanon, Turkey, Iran and Iraq provides information on the measures undertaken by these countries respectively to implement the 2030 Agenda for Sustainable Development, and elaborates on measures to achieve the Sustainable Development Goals (SDGs)

on food security and promote sustainable agriculture. The countries can use their respective findings with regards to agricultural production and availability of water and collaborate to create policies to increase food security in the shared basins.

- ≡ The Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) is working to create a 'Climate Data Rescue' portal which will make available data related to climate change impacts on agriculture. Jordan, Lebanon, Iraq and Syria (that are part of the RICCAR) can make use of the portal to collaborate on implementing the climate change adaptation practices that will be suggested by RICCAR through the portal.
- ≡ The national governments can invest in a pan-regional research program to promote research in climate change adaptation and mitigation measures in agriculture. Adaptation measures can include investments in improved land management, adjustment of planting dates of crops and introduction of new crop varieties. Mitigation measures can include improving energy efficiency (such as composting) and crop yields (through pest management, maintenance of irrigation equipment) and increasing carbon storage through new land management techniques (such as planting nitrogen-fixing crops in rotation). Additionally, countries can also implement climate change adaptation and mitigation practices as described in their respective United Nations Framework Convention on Climate Change (UNFCCC) Climate Change Communication reports.

## IV. Intra-Regional Trade Commission to Eliminate Harmful Trade Practices

- ≡ An intra-regional trade commission/programme can be established to eliminate harmful import tariffs as well as certain export bans which negatively affect agricultural trade practices. In November 2012, the Jordanian government lifted fuel subsidies which impacted the cost of using irrigation equipment. This resulted in higher food prices in the local market. Such practices that can be looked into by the commission.
- ≡ Additionally, such a commission can promote trade of surplus crops and reduce

imports from foreign countries. Jordan, Iran, Iraq, Syria and Turkey imports 50% of its food requirement. For example, instead of relying on Russia for wheat, Jordan can import wheat from Iran, thereby reducing the transport costs and also ensuring timely availability of the crop.

- ≡ The Table gives the imports and exports of countries in the Middle East. This can be used to reduce dependence on foreign nations for agricultural trade, thereby increasing inter-regional trade.

|                      | IMPORT |                | EXPORT                                     |
|----------------------|--------|----------------|--|
| Wheat, barley, rice  | ➡      | <b>Jordan</b>  | ➤ Tomatoes, vegetables                     |
| Rice, wheat, barley  | ➡      | <b>Iran</b>    | ➤ Fruits, potatoes, cucumber, wheat, flour |
| Rice, corn, tomatoes | ➡      | <b>Iraq</b>    | ➤ Fruit, wheat                             |
| Rice, barley, wheat  | ➡      | <b>Syria</b>   | ➤ Fruits, tomatoes, potatoes               |
| Wheat, barley, maize | ➡      | <b>Lebanon</b> | ➤ Potatoes, fruits, rice                   |
| Wheat, flour, fruits | ➡      | <b>Turkey</b>  | ➤ Tomatoes, rice, wheat                    |

- ≡ Additionally, the commission can help countries to develop guidelines using internationally recognized guidelines, like the World Trade Organization (WTO) Doha Round guidelines as a framework in order to prevent countries from adopting practices which will be harmful to the agricultural markets (such as export bans, embargoes, price rise etc.)

## V. Basin-wide Farmers' Cooperative Trade Associations

- ≡ The existing communication gap between the national governments and farmer's trade associations in Jordan and Turkey has led to a misapplication of technical rules and specifications of crops, vegetables and fruits to be grown for the domestic market and for exports and planting of seasonal crops based on rainfall predictions. To improve the 'value-chain' approaches for upcoming harvests, de-centralized mechanisms like 'Farmers' Cooperative Trade Associations' can be established by the respective Ministries of Agriculture. Such associations can engage in cross-border exchange of best practices in order to improve the yield of crops in the shared river basins.
  - The associations can engage in training and capacity building on post-harvest

management to minimize loss, storage for perishable grains, food processing and marketing of crops;

- Act as a platform for farmers to exchange best practices (such as cultivating crops in irrigated areas when rainfall is less for rain-fed crops, cultivation of cover crops, crop rotation);
  - These associations can act as a liaison between the respective national governments and farmers in the basin to ensure timely distribution of certified seeds for winter and summer crops;
  - Additionally, they can distribute bio-fertilizers as opposed to chemical fertilizers in order to increase the productivity of the crop and retain the arability of the land.
- ≡ Iran and Lebanon also have farmers' cooperative trade associations which engage in storage of food in granaries and processing of food respectively. As mentioned previously, the associations can play a major role if there is cross border coordination which could be beneficial for Iran and Lebanon as well. Such associations could also be encouraged to be created in Syria and Iraq thus creating a network of Farmers Cooperative Trade Associations in the region.

## VI. Regional Framework and Guidelines on Food Security

### ≡ Part A: Objectives

- The agreement can take cognizance of the target from Sustainable Development Goal 2 (SDG 2) - SDG 2 (2.1): "end hunger, achieve food security and improved nutrition and promote sustainable agriculture"
- The six countries discussed in this report have different strategies, programmes, guidelines on food policy, all of which are domestic. Additionally, the countries have few bilateral agreements to exchange crops.
- Suggestion: A basic legal instruments which can provide an outline of key broad provisions and secondary instrument (protocols, regulations and guidelines) to implement operational aspects of the policy, processes or procedural issues, can be adopted. The legal instruments can be a pan-regional one or on specific issues which can be implemented by countries on shared river basins.

## ≡ Part B: Short-term Measures

- Inclusive governance: Formulating the working principles for and establishing mechanisms/bodies which work in a participatory manner (such as establishing Farmers Trade Associations comprising of representatives of farmers in shared river basins to participate in decisions of the government affecting them).
- Infrastructure: Improving infrastructure policies to strengthen cross-border marketing corridors, for instance, improving road-port network to facilitate transport of agricultural crops from surplus to deficit areas.
- Promoting research on innovative agricultural technologies: Countries can jointly work with academics and researchers to develop guidelines for crop varieties which are suited to the physical environment conditions of the region.
- Formulate a program to implement climate change adaptation and mitigation practices in agriculture.
- Financial incentives can be provided to farmers in shared river basins using the following outline:
  - » Crop insurance for cultivating crops based on weather
  - » Credit to holders of small lands to purchase improved irrigation technologies (like evapotranspiration (ET) based irrigation scheduling will result in the appropriate amount of water applied for crop growth)
  - » Subsidies for construction of granaries to store perishable grains.
- Working group to monitor the food security scenario: The working group could be comprised of experts and academics of the region, to work in close collaboration with other major stakeholders like the Farmers Trade Associations and Ministries of Agriculture of the respective countries. The working group can monitor food production, trade, prices, policies, as well as market speculation. Additionally, the group can develop a guidance framework on disaster preparedness which can include - the optimal level of grain reserves to be held for food security emergencies, when and how to release them and at what prices.
- International cooperation: Formulate guiding principles for technical assistance and capacity building with the help of international organizations like FAO and World Food Program (WFP).
- Implementation and Monitoring - Countries can undertake to review the agreed upon framework and publish results of the framework which can be made publicly available.

### Part C: Long-term Measures

- Improving nutrition intake by promoting the growth of quality crops.
- Countries can jointly collaborate to establish a regional statutory body to formulate agricultural policies in the region through environmentally sustainable production, fair trade and gender mainstreaming (for e.g. repeal discriminatory laws which prohibit access of land to women).

# Chapter IV

# Drought Management

## I. Institutional Benefits

- ≡ A creation of regional database on drought
  - United Nations Educational, Scientific and Cultural Organization (UNESCO) has proposed the institutionalisation and formation of National Drought Information System (NADIS) in Iraq to improve the understanding of the scientific basis of droughts including their definition, monitoring, impacts, and prediction and a need to bring this knowledge to sector experts involved in various aspects of drought management. The body is proposed to undertake studies of historical frequency, duration and spatial extent of drought assists planners in determining the likelihood and potential severity of future drought episodes. The scientific and officially authorized information repository would comprise a central database and environmental information management system(s), plus rules and defined mandates for monitoring, early warning (preparedness) and drought management (action planning) per sector.

- Another initiative called the MAWRED Knowledge Hub aims to empower decision-makers across the Middle East and North Africa (MENA) region for managing droughts and their impacts on water and food security. The drought maps and supporting water, climate and agricultural data is made available through the MAWRED Knowledge Hub generated by the International Center for Biosaline Agriculture (ICBA). The information is fitted to end-user needs in the region. The knowledge hub is a component of the Regional Drought Management System (RDMS) for the MENA and “focusses on drought risk management through the development of monitoring and early warning systems, and preparedness and mitigation measures”. It intends to serve the region in 3 major ways:
    - » “Establishing a regional drought monitoring and early warning system and associated information delivery systems;
    - » Providing assessment of drought vulnerabilities and impacts;
    - » Developing actions and measures to mitigate and respond to drought impacts”.
  - **Scaling up of similar initiatives in the region will yield institutional cooperation as it will create region-wide repository of information that could be used by varied stakeholders.**
- ≡ Establishment of a River basin-wide Drought Monitoring Mechanism and Early Warning Systems
- Lebanon, Jordan, Tunisia and Morocco have undertaken a project to establish drought monitoring system for drought planning. The project is based on the guidelines prepared by the Integrated Drought Management Programme. It draws a three-pronged strategy to achieve its goals namely;
    - » Establishing early drought monitoring system by creating state-of-the-art systems
    - » Assessment of drought vulnerabilities and impacts
    - » Preparation of action plans for drought mitigation.
  - The project receives international support from USAID, National Drought Mitigation Center, National Drought Mitigation Center (NDMC) University of Nebraska-Lincoln and FAO. The project aims to establish state-of-the-art systems to monitor drought.
  - This project underlines a collaborative approach towards drought risk

management. Though this project is implemented domestically by the implementing countries but exploring opportunities to implement a similar initiative on the scale of shared river basins can foster cooperation and pave the way to create robust mechanisms for drought monitoring and prediction.

### ≡ Opening up avenues for cooperation by conducting Joint Vulnerability and Risk Assessments on shared rivers

- The World Meteorological Organization (WMO) and Global Water Partnership (GWP) have developed an Integrated Drought Management Programme (IDMP) which has published national drought management policy guidelines, including information and guidelines on how to conduct a drought risk assessment.
- **Joint risk and vulnerability assessments by joint teams assigned by riparian countries in the catchment areas of shared water resources can provide impetus for cooperation if there is a room for the risks to be managed jointly. For example, the teams that are formed to conduct risk assessments are comprised of sectoral experts and other relevant stakeholders who have knowledge regarding drought. If joint teams are formed with the authorisation of riparian countries they can suggest avenues of cooperation, such as preparing joint drought adaptation and mitigation programmes.**

## II. Security Benefits

### ≡ Decreased Migration

- Many experts and scientists have stated that drought was one of the factors behind the unrest that led to the Syrian conflict in 2011. The Syrian conflict has claimed around 500,000 lives, generated 4.8 million refugees and displaced almost 6 million people within Syria. A NASA study found that the drought that began in 1998 in the Eastern Mediterranean Levant region which includes Jordan, Lebanon, Syria, and Turkey, was likely the worst drought in 9 centuries. Moreover, studies suggest that drought in Syria from 2006-10 led to large-scale internal migration from rural to urban areas. Drought induced internal migration caused population pressure in the urban areas and is considered as an important contributory factor to the unrest in Syria. Another study suggests that by 2050, midday temperatures in summer days in the region could rise over 50 degrees Celsius and heat waves could occur ten times more often than they do now. The

study also found that Iraq and Syria witnessed an increase in particulate pollution attributable to an increase of sand storms, as a result of prolonged droughts. This will further exacerbate climate and drought induced migration in the future.

- This outlines that the role of recurrence of multi-year droughts and the arising water scarcity cannot be ignored while addressing the issue of internal migration as well as migration to neighbouring countries. This has to be viewed from a regional perspective and should be addressed by formulating joint strategies to address drought induced cross regional migration.

# Basin-wide Benefits Resulting from Institutional Cooperation

## Irrigation

### Water Users Associations

**Functions:** Operation and maintenance of local water system such as a river basin

**Potential benefits:** Regional water management

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## Food Security

### Emergency grain reserves

#### Functions

- Monitor exchange of crops during food crisis
- Undertake periodic stock of available food grains
- Provide guidance on the optimal level of grain reserves to be held for food security emergencies and also when and how to release them

#### Potential benefits

Countries can safeguard themselves against:

- Seasonal variations
- Effects of climate change
- Humanitarian crisis
- Conflict

### Intra-regional trade commission

#### Functions

Eliminate certain harmful practices like:

- Specific import tariffs
- Export bans
- Embargoes
- Monitor the food situation to prevent excessive price volatility

#### Potential benefits

- Promote trade of surplus crops and reduce dependence on foreign imports
- Reduced transport costs
- Timely availability of crops

## Farmers' cooperative trade associations

### Functions

Cross-border exchange of best practices in order to improve the yield of crops in the shared river basins, including:

- Training and capacity building on post-harvest management to minimize loss, storage for perishable grains, food processing and marketing of crops;
- Act as a platform for farmers in shared river basins to exchange best practices (such as cultivating crops in irrigated areas when rainfall is less for rain-fed crops, cultivation of cover crops, crop rotation; use of bio-fertilizers as opposed to chemical fertilizers);
- Liaison between the respective national governments and farmers in the basin to ensure timely distribution of certified seeds for winter and summer crops
- Improved irrigation technologies like evapotranspiration (ET) based irrigation scheduling can result in the appropriate amount of water applied for crop growth

### Potential benefits

- Improved access to cross-border markets
- Adopting efficient practices in agriculture can result in reduction of water consumption per capita in the river basin

## Drought Management

### Regional database on drought

#### Functions

- Improve the understanding of the scientific basis of droughts including categorization of drought, monitoring, impacts and prediction
- Undertake studies of historical frequency, duration and spatial extent of drought assists planners in determining the likelihood and potential severity of future drought episodes

#### Potential benefits

- Creation of a region and basin wide repository of information for risk-preparedness by variety of stakeholders

# Chapter V

## Protecting Water Infrastructure

During the war in Syria and Iraq, water infrastructure suffered great damage due to acts of violence perpetrated by various actors in the region. Some reports show that there were at least 49 attacks in which water was a target of violence – those attacks included closing dams, flooding villages, poisoning and diverting water.

The Middle East is already a region under severe water stress. Additionally there is little coordinated protection of water infrastructure between countries. Terror free water infrastructure requires coordinated regional cooperation that brings positive outcomes to countries that engage in it. Some of the benefits are as follows:

### I. Securing Jobs and Food

- ☰ Protection of water infrastructure is translated into land protection and preservation of water for irrigation. This helps secure jobs in the agriculture sector along with food to feed the population even during war times.
  - **In Syria:** Water infrastructure free of terrorism could have increased at least

60% of farming GDP compared to the current situation today as the total area of cultivation has been reduced from 6 million to 3.6 million hectares.

- **In Iraq:** Capture of the Ramadi Dam in May 2015 drastically reduced the water for the irrigation systems and treatment plants in the predominantly Shiite downstream provinces of Babil, Karbala, Najaf and Qadisiyah. These provinces are Iraq's most important agricultural centres, thereby putting the food security of the entire country at risk. Iraq would have produced 40% more food compared to today's production if water infrastructure would have been protected and maintained, that would have resulted in at least USD 20 billion of income in 2016.

## II. Preservation of Water Quality

- ≡ On 6 December 2017, for the first time at a UN Environment Assembly, environment ministers issued a declaration in which nations would honour efforts to prevent, mitigate and manage the pollution of air, land and soil, freshwater and oceans – which harms our health, societies, ecosystems, economies and security. The assembly also passed 13 non-binding resolutions and three decisions. Among them were moves to address pollution in areas hit by conflict and terrorism.
- ≡ This region is struggling with poor water quality issues due to salinity and other pollutants. One of the reasons for this is the limited exchange of data between the countries on their shared water resources. This is made worse by lack of protection of infrastructure.
- ≡ ISIS deliberately contaminated drinking water with crude oil in the Balad district of the Salahaddin Governorate in December 2014 and poisoned water supplies from Aleppo, Deir ez Zor, Raqqa and Baghdad. Today, 7 million residents of Baghdad suffer due to the shortage of clean drinking.
  - As terrorist groups tried to poison water during the war, clean water availability was reduced. The government in Syria is already struggling to provide clean water for the population. Poisoning water directly affects water quality and direct water access, and consequently contaminates the food chain.
  - **If there was coordinated protection of water infrastructure in place, then governments would be better equipped to provide for the population even during armed conflicts.**

### III. Safeguarding the Provision of Services such as Electricity and Irrigation

- ≡ The conflict has destroyed significant water infrastructure. In some cases, various groups have used tactical water and power cuts to target specific population areas. ISIS has blocked water pipes in various villages including the predominantly Christian town of Qaraqosh in Iraq.
- ≡ As mentioned before, ISIS also captured the Ramadi Dam in May 2015, drastically reducing water required for irrigation systems and treatment plants in the predominantly Shiite downstream provinces. As a consequence it affected the functioning of dams that are essential for production of energy and irrigation. Protecting water infrastructure will allow services such as electricity and water to be preserved thus diminishing the consequences of conflict.

### IV. Prevents Weaponization of Water

- ≡ Water has also been used as a weapon by terrorists threatening to wipe out villages by diverting rivers or flooding villages. Blockage of the Falluja Dam floodgates and diversion of the water over an irrigation channel into a side valley led to the destruction of more than 10,000 houses, 200 square kilometres of fertile farmland, and almost the entire harvest as well as the livestock. Up to 60,000 residents in the area lost their livelihood and were displaced by the flood. Cooperation over protecting water infrastructure could prevent these kinds of events.

### V. Less Economic Damage/ Better Resilience

- ≡ If jobs are secured, food is available and essential services are provided, the economy will recover faster. Reconstruction in post conflict situations is easier and less costly as the countries will quickly restore their production capacity and human capital levels.
- ≡ There is also good reason to believe that the agricultural sector could be a driver of

economic growth in post-conflict Iraq in ways that favour the poorest populations most and protection of water infrastructure is essential to meet that end.

## VI. Implementation of Cooperation

- ≡ The protection of water infrastructure in the Middle East is almost non-existent. It can be concluded that the countries could cooperate on water infrastructure by following certain guidelines:
  - Cooperate domestically and across borders. Water infrastructure protection requires trans-boundary cooperation as terrorist attacks against water infrastructure are likely to have implications beyond national borders; therefore, regional and international perspectives need to be integrated.
  - Intelligence sharing is required when preventing terrorist attacks on critical infrastructure.
  - Physical presence is required to avoid the attack.
  - Water monitoring is required to quickly identify any attack.
  - Response and recovery need to be in place as a coordinated plan.
  
- ≡ Implementing these practices through cooperation would mutually benefit the countries in the region in protecting their water infrastructure.

# Chapter VI

## Ecosystem Protection

### I. Cooperation on Tigris-Euphrates Marshlands

| <b>Types of Benefits</b>                   | <b>Means of Cooperation</b>  | <b>Potential Benefits</b>   |
|--|--|---|
| Strengthening Food Security and Livelihood | Re-flooding the marshes with waters from Iraq and Iran   | Re-generation of the native cod fish that around 500,000 Marsh Arab people living in the border area between Iraq and Iran depend on for their subsistence.<br><br>Increase in productivity of the date palm plantations in Qurna marshes |
| Economic                                   | Implementing projects similar to the 'New Eden Plan' led by Nature Iraq and Italian Ministry for the Environment, Land and Sea | Creation of the Mesopotamia Marshlands National Park jointly managed by Iraq and Iran<br><br>The potential of ecosystem services of the marshes (such as eco-tourism, carbon  |

|               |   |  |
|---------------|---|--|
|               |   | sequestration, habitat for communities) are valued up to USD 3.4 billion per year and approximately USD 3,370 per hectare of marshes per year  |
| Environmental | Cooperation under Ramsar Advisory Mission | <p>According to experts, the recovery of the marshes has declined due to the recurrence of drought or drought like situation that has lasted over a period of 14 years. Cooperation between countries on this issue could lead to drought mitigation and prevention.</p> <p>Water Ministry of Iraq and UNEP study states that around 30% of re-flooding of the marshes with waters from Iraq and Iran will lead to a re-generation of endemic species of birds and fish in the marshlands that are endangered due to drought</p> |

## II. Ecotourism Hotspots

- ≡ The Mesopotamian marshlands hold great historic and religious significance and could potentially be developed for ecotourism. The Iraqi government is working on this by involving ecologists to ensure that sufficient standards are achieved to make the marshlands an international tourist destination. However, since it's a border marsh, any development with respect to tourism or otherwise, needs to be in cooperation with Iran to yield maximum benefits.
- ≡ Similarly, Yarmouk has rich archaeological and historical sites and landscapes with great touristic value. In 2010, the Jordanian Royal Society for the Conservation of Nature (RSCN) established the Yarmouk forest reserve of 20 square kilometres as a

part of the Jordan Rift Valley Project. In 2015, under the framework of Convention on Biological Diversity, a draft plan was developed for Jordan to develop its side of the Yarmouk basin into an ecotourism hub with sustainable practices. These developments can be done in conjunction with Syria. The ecotourism strategy for Jordan on Yarmouk could be an aspect of post conflict reconstruction in Syria.

- ≡ Additionally, the involvement of the civil societies based in these riparian countries could pave the way for wider involvement towards joint ecotourism projects which could thereby promote the use of environmental friendly practices in the basin, ultimately leading to the better management of the shared water resources in these countries.
- ≡ **Furthermore, the cooperation on the ecotourism projects could lead to further cooperation among the governments of these countries and create a platform for collaboration on setting up of multiple joint water monitoring stations amongst these countries as mentioned earlier.**

### III. Region-wide Restoration of Water Bodies from an Ecological Perspective

- ≡ Over the past few decades, many smaller water bodies in the Middle East region have either shrunk or disappeared entirely. Overall, countries in the region have not prioritized the issue of cooperating with neighbours to maintain environmental flow of rivers. While in the short term, in a water-stressed region like the Middle East, environmental flow may not seem like a priority, it is essential to maintain the long-term water security of the region. This is an area that requires further consideration amongst the countries in the region, especially those with shared water resources.
- ≡ River restoration is becoming an increasingly popular way to improve degraded water resources across the globe. Within the context of water scarcity and poor water quality in the Middle East, river restoration becomes a viable option to improve river ecology and environment quality for long term sustenance of rivers. While it is impossible to bring rivers back to their original state, conserving the undegraded part of the river by minimising and mitigating any negative impacts on the river could rehabilitate a shrinking river.

- ≡ Restoration activities includes creating infrastructure for water treatment, construction of public parks and recreational facilities along restored stretches of the river to increase public support for conservation.
- ≡ A basin-wide or region-wide effort in the Middle East on restoration of rivers would be extremely helpful to ecosystem conservation efforts. Water Evaluation and Planning System (WEAP) is a software tool which calculates water demand, supply, flow, crop requirement, and pollution level.
- ≡ WEAP also provides scenarios and management options to policy makers. The WEAP forum has 186 countries and Jordan, Lebanon, Syria, Iraq, Iran and Turkey are all part of the same. However, it is unclear as to what extent it is being used by the countries. With the help of regional experts and scientists, the WEAP or similar models can be used for efficiently managing and restoring shared water resources in the region.

#### IV. Basin wide Community based Conservation - Hima

- ≡ Hima is a traditional community based conservation process by which an area rich in natural resources or bio-diversity is declared protected and cannot be privately owned. Hima has high success rate as it has been practised for more the 1400 years in the Arabian Peninsula.
- ≡ Benefits of Hima:
  - Resources are used sustainably by and for the local communities living in the area adjacent to the protected land.
  - Provides tangible benefits to the local population, thereby ensuring sufficient incentives for the communities to invest in conservation measures.
  - More resilient in times of crisis situations such as conflicts and humanitarian disasters as compared to other conservation programmes. This was seen in Lebanon during the 2006 war.
- ≡ Himas are implemented domestically as seen in Lebanon, Tanzania, Morocco, and Indonesia. They have the potential to be implemented jointly with riparian nations on shared water resources.

- ≡ Lebanon has implemented the Hima on its side of the Orontes Basin protecting endangered birds and mammals, promoting sustainable use of natural resources, as well as eco-tourism activities. This can be extended to Syria and Turkey.
- ≡ Syria had Himas in the highlands along the Syrian-Lebanese border used primarily for winter grazing of goats. Their status at present is unknown. This model can be implemented basin wide in Syria as well as in Turkey, which could help in the post conflict reconstruction efforts in Syria.
- ≡ In 2013, the Jordanian Ministry of Agriculture, in partnership with the International Union for Conservation of Nature – Regional Office of West Asia and the Arab Women Organization implemented the Hima in Bani Hashem villages in Jordan with funding from the European Commission. The objective of the project was the natural rehabilitation of the land and the revival of the indigenous plants in the area. Based on the lessons learnt from this project, a similar Hima project could be implemented jointly by Jordan and Syria in the Yarmouk basin to protect the area around the basin.

# Conclusion

## I. Hydropower

### Observation

The joint dam projects and the dams located in the border areas of Iraq, Iran, Jordan, Lebanon, Syria and Turkey have a collective hydropower potential of 1400-1600 MW and water to irrigate thousands of hectares of land, which can improve the lives of around 32-35 million people living in the basin areas of the riparian countries.

### Recommendation

The hydropower generated by these dam projects could be linked and shared amongst Iraq, Iran, Jordan, Lebanon, Syria and Turkey by setting up a regional electricity grid. In addition, cooperation on these dam projects could, to a certain extent, settle the conflict between the riparian countries on the usage of the shared electricity from the shared water.

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## II. Irrigation

### Observation

Total irrigated land in Turkey, Syria, Iraq, Iran, Lebanon and Jordan is almost 18 million ha, of which about 80% is still irrigated using traditional irrigation systems, causing water loss of 35-60%, and switching to modern irrigation techniques can reduce water loss in the region by 5-20%.

### Recommendation

The countries can establish a regional framework for developing a knowledge exchange platform to exchange know-how and provide guidance and training sessions on using better irrigation technology, setting up wastewater treatment plants and water users associations (WUAs) for ultimately improving the irrigation efficiencies in all countries.

## III. Food Security

### Observation

Jordan, Syria, Turkey, Iraq and Iran can gain from engaging in intra-regional trade to fulfill its food import which stands at 50% of its total food requirement.

### Recommendation

An Intra-Regional Trade Commission can be established to meet the food requirements in the region. Additionally, a regional food security policy can be formulated to include change in crop varieties to increase agricultural productivity and implement climate change adaptation practices in agriculture.

## IV. Drought Management

### Observation

Regional cooperation can improve countries' capacity to monitor and better manage the impacts of the multiple droughts faced by these countries.

**Recommendation**

The countries can develop a regional drought mitigation mechanism by establishing drought monitoring systems and early warning systems. This can be accompanied by formation of a Regional Drought Information System to undertake studies of historical frequency, duration and spatial extent of drought at a regional, as well as at a basin wide level.

**V. Protecting Water Infrastructure****Observation**

Protection of water infrastructure can improve the countries' resilience which can help in post conflict reconstruction.

**Recommendation**

There is little coordinated protection of water infrastructure between countries in the Middle East. Protection of water infrastructure will require transboundary and regional cooperation in matters of intelligence, physical presence, water monitoring, response and recovery.

**VI. Ecosystem Protection****Observation**

Regeneration of marshlands in the Tigris-Euphrates basin can help 500,000 Marsh Arabs and generate a potential income of USD 3.4 billion per year. Establishing a community-based conservation process could offer resilience during conflicts and provide tangible benefits to the local population.

**Recommendation**

Mesopotamian Marshlands could be revived and restored through cooperation between all riparian nations in the Tigris-Euphrates basin and 'Himas' should be implemented in all shared river basins in the region to promote transboundary cooperation.

## Total Benefits of Water Cooperation

| Means of Cooperation               | Energy | Secure Jobs | Food | Health | Eco-system | Economy | Resilience | Peace |
|------------------------------------|--------|-------------|------|--------|------------|---------|------------|-------|
| Hydropower                         | ●      | ●           | ●    |        |            | ●       | ●          | ●     |
| Irrigation                         |        | ●           | ●    |        |            | ●       | ●          | ●     |
| Water Quality                      |        | ●           | ●    | ●      | ●          | ●       | ●          | ●     |
| Grain reserve                      |        | ●           | ●    |        |            | ●       | ●          | ●     |
| Revival of marshlands              |        | ●           | ●    |        | ●          | ●       | ●          | ●     |
| Climate change adaptation          | ●      | ●           | ●    |        |            | ●       | ●          | ●     |
| Protection of Water Infrastructure | ●      | ●           | ●    | ●      |            | ●       | ●          | ●     |
| Intraregional Trade                | ●      | ●           | ●    |        |            | ●       | ●          | ●     |
| Exchange of Best practices         | ●      | ●           | ●    | ●      | ●          | ●       | ●          | ●     |

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## About Blue Peace in the Middle East

The Blue Peace in the Middle East process was initiated in 2009 and, has been steered by Strategic Foresight Group.

In 2011, SFG published the Blue Peace in the Middle East report which made a number of recommendations regarding how water could be used as a source of cooperation, rather than conflict, in the Middle East. These recommendations were intended to enable cooperation that would build broader peace and stability in the Middle East.

The period since then has seen multiple crises of political, security and environmental dimensions in these countries. At a time when communication systems between the policy structures of the countries had broken down, the Blue Peace community had emerged as a soft infrastructure of dialogue on water cooperation in the region.

Over the course of 2017-18, regional experts from Turkey, Jordan, Iraq, Syria, Lebanon and Iran, along with regional and international experts, met a number of times with the objective of transferring the management the Blue Peace Process in the Middle East from Strategic Foresight Group to regional institutions based out of these countries.

In late 2018, a new mechanism for regional cooperation on water resources in the Middle East was created with input from all relevant stakeholders. This new mechanism will be fully owned and driven by experts in the region, building on the decade long promise of the Blue Peace Initiative.

## About Strategic Foresight Group

Strategic Foresight Group (SFG) has launched a number of global and regional initiatives to use water as a force for peace.

SFG has played a critical role in recognition of the strategic importance of water by important countries including the convening of the first ever debate on water, peace and security in the United Nations Security Council. It has created the Water Cooperation Quotient to measure the intensity of cooperation between countries sharing water resources. It has cooperated with the Government of Switzerland to establish the Global High Level Panel on Water and Peace, co-convened by 15 countries, to recommend worldwide architecture for positive water and peace linkages. SFG has collaborated with the Brazzaville Foundation for Peace and Conservation to conceive the Congo Basin Blue Fund for water cooperation among 11 countries of the Congo Basin in Africa. It has formed the Blue Peace Community of champions of transboundary water cooperation in the Middle East at a time when violent conflicts have engulfed the region. It has sensitised several million people from all continents through articles on water cooperation in over 100 different newspapers in various languages. It has also been engaged in regional initiatives for water diplomacy in Africa, Asia and the Middle East.

Strategic Foresight Group is an international think-tank based in Mumbai which is known for creating new forms of intellectual capital. Its recommendations have been discussed in the United Nations, World Bank, World Economic Forum (Davos), European Parliament, Indian Parliament, UK House of Commons and House of Lords, UN Alliance of Civilizations, among other institutions from around the world.

In addition to water diplomacy, SFG is known for its pioneering work in conflict resolution, deconstructing terror, scenario planning, and mapping global paradigm shifts.



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