



United Nations Development Programme

**Project Document template for nationally implemented projects
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Project title: Enabling implementation of the Regional SAP for the rational and equitable management of the Nubian Sandstone Aquifer System (NSAS)		
Country: Chad, Egypt, Libya and Sudan	Implementing Partner: UNESCO-IHP	Management Arrangements: IGO
<p>UNDAF/Country Programme Outcome:</p> <p><i>Chad: (2017 – 2020) Outcome 5: By 2021, farms, fishing communities and small producers, notably youth and women, in targeted regions, use sustainable production systems that allow them to meet their needs, bring food to market and adopt a living environment that is more resilient to climate change and other environmental challenges.</i></p> <p><i>Egypt: (2013-2017): Outcome 5.3: The Government of Egypt and local communities have strengthened mechanisms for the sustainable management of, and access to, natural resources such as land, water and ecosystem</i></p> <p><i>Libya: There is no UNDAF programme for Libya</i></p> <p><i>Sudan (2018 -2021): Outcome 2: By 2021, people’s resilience to consequences of climate change, environment stresses and natural hazards is enhanced through strengthened institutions, policies, plans and programmes</i></p>		
<p>UNDP Strategic Plan Output:</p> <p>Output 2.5: Legal and regulatory frameworks, policies and institutions enabled to ensure the conservation, sustainable use, and access and benefit sharing of natural resources, biodiversity and ecosystems, in line with international conventions and national legislation.</p> <p>Output Indicator 2.5.1: Extent to which legal or policy or institutional frameworks are in place for conservation, sustainable use, and access and benefit sharing of natural resources, biodiversity and ecosystems</p>		

UNDP Social and Environmental Screening Category: Low	UNDP Gender Marker: 1
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<p>Brief project description:</p> <p>The Nubian Sandstone Aquifer System (NSAS) is one of the largest aquifer systems in the world, stretching over approximately 2.6 million square km in Northeast Africa. It extends about 1,600 km East-West and North-South across Chad, Egypt, Libya and Sudan. Fresh groundwater reserves in the aquifer system is estimated at 372,950 billion cubic metre (BCM), out of which only 3.9% is recoverable with present-day technology.</p> <p>The riparian countries sharing the aquifer system face similar problems of arid climate, scarce surface water resources, persistent droughts and fragile ecosystems. The aquifer is a critically important source of water in this arid desert region and will be increasingly in demand in the future. Hence, all four countries have given priority to linking the NSAS groundwater exploitation to national development strategies and plans. Growing pressures on the aquifer system pose threats to both the quantity and quality of the resource and could, if not appropriately managed, lead to transboundary/shared problems and tension.</p> <p>To address any potential tension that may impede the rational and equitable management of the aquifer system, a technical data-gathering element of the project, Shared Aquifer Diagnostic Analysis was prepared and a regional Strategic Action Programme (SAP) for the aquifer system formulated and approved by ministers from four countries on the 18th September 2013 in Vienna.</p> <p>Without further support, the goal of the endorsed SAP will not be achieved within the Nubian Aquifer Sandstone System (NSAS). While there have been significant advances in the understanding of the hydrogeology of the NSAS there is still a need to develop and enhance capacity to assess and protect the ecosystems dependent on the water resources of the aquifer, in particular to mitigate the potential impacts of climate change and variability within the region. In addition, the NSAS Joint Authority needs further strengthening to develop and implement effective management actions.</p> <p>This project will initiate the implementation of the agreed SAP through:</p> <ul style="list-style-type: none"> • Address gaps in knowledge on the NSAS resources and dependent ecosystems; • Support capacity development at local, national and regional levels to ensure the Joint Authority and the national authorities are best able to manage the water resources and dependent ecosystems; 	

- Facilitate national reforms on policies necessary to successfully implement the SAP and support the formulations of National Action Plans linked to the SAP;
- Utilise the participation and results from four pilot actions to demonstrate improved management approaches at the national and local level using practices encouraged through the project and experiences from other regional initiatives;
- Identify future financing options to assist the countries and the Joint Authority in the longer term to implement the agreed SAP.

All project activities will follow a gender strategy to be developed in the inception phase and will, as a minimum, record sex-disaggregated data on all participants. The activities to initiate the implementation of the SAP will assist the four governments in collaborative actions that will both strengthen their capacity on environmental management and improve the livelihoods of the local population dependent on the resources of the NSAS.

FINANCING PLAN

GEF Trust Fund <i>or</i> LDCF <i>or</i> SCCF <i>or</i> other vertical fund	USD 3,990,000
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(1) Total Budget administered by UNDP	USD 3,990,000
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PARALLEL CO-FINANCING (*all other co-financing that is not cash co-financing administered by UNDP*)

Government Chad	USD 2,000,000
Government Egypt	USD 5,000,000
Government Libya	USD 2,000,000
Government of Sudan	USD 2,000,000
UNDP	USD 300,000
UNESCO	USD 4,000,000
IAEA	Will consider approving a regional project under the IAEA Technical Cooperation Programme for 2020-2021 if approached by the four countries
FAO	USD 1,750,000
WWAP	USD 400,000
IGRAC	USD 200,000
AIDA	USD 30,000
Sant'Anna School of Advanced Studies	USD 50,000
(2) Total co-financing	USD 17,730,000

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SIGNATURES		
Signature: print name below	Agreed by Implementing Partner	Date/Month/Year:
Signature: print name below	Agreed by UNDP	Date/Month/Year:

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ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
BCM	Billion Cubic Metres
CapNet	International network for Capacity Building in Integrated Water Resources Management
CLEQM	Central Laboratory for Environment and quality Monitoring, NWRC
CEDARE	Centre for Environment & Development for the Arab Region and Europe
CSO	Civil Society Organisation
ESIA	Environmental and Social Impact Assessment
FAO	UN Food and Agriculture Organisation
GEB	Global Environmental Benefits
GEF	Global Environment Facility
GEF-OPF	GEF Operational Focal Point
GIS	Geographical Information System
IAEA	International Atomic Energy Agency
IEO	(UNDP) Independent Evaluation Office
IFAD	International Fund for Agricultural Development
IGRAC	International Groundwater Resource Centre
IIASA	International Institute for Applied Systems Analysis
IMC	Inter-ministerial Co-ordination (committee)
IP	(UNDP) Implementing Partner
IRH	(UNDP) Istanbul Regional Hub
ISARM	International Shared Aquifer Resource Management
IW	(GEF) International Waters (Focal Area)
IW:LEARN	(GEF) International Waters Learning Exchange and Resource Network
IWRM	Integrated Water Resources Management
JA	Joint Authority
JA NO	Joint Authority National Offices, Ndjamená , Cairo, Tripoli, and Khartoum
LCBC	Lake Chad Basin Commission
LoA	Letter of Agreement
M&E	Monitoring and Evaluation
MSP	(GEF) Medium Sized Project
MTR	Mid-term Review
MWRI	Ministry of water resources and Irrigation, Egypt
NAPA	National Adaptation Plans of Action
NAPs	National Action Plans
NIM	National Implementation Modality
NWRC	National Water Research Centre, Egypt
NGO	Non-governmental Organisation
NSAS	Nubian Sandstone Aquifer System
NWAS	North-Western Sahara Aquifer System
OSS	Sahara and Sahel Observatory
PIR	Project Implementation Report
PMU	Project Management Unit
PNAS	Post Nubian Aquifer System
POPP	UNDP Programming and Operations Policies and Procedures
PRSP	Poverty Reduction Strategy Paper

PSC	Project Steering Committee (Project Board)
RTA	(UNDP) Regional Technical Advisor
RIGW	Research Institute for Groundwater, NWRC
SADA	Shared Aquifer Diagnosis Analysis
SAP	Strategic Action Programme
SDG	Sustainable Development Goal
SSTrC	South-South and Triangular Co-operation
TBWP	Total Budget and Workplan
TE	Terminal Evaluation
TEM	Transient Electro-Magnetic
TRAC	UNDP Target for Resource Assignment from the Core
TT	Tracking Tool
TWAP	(GEF) Transboundary Waters Assessment Programme
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO-IHP	United Nations Educational, Scientific and Cultural Organisation - International Hydrological Programme
UNGA	United Nations General Assembly
UNOPS	United Nations Office for Project Services
USD	United States Dollar
WWAP	World Water Assessment Programme
Yr	Year

1 DEVELOPMENT CHALLENGES

1.1 Background and rationale

The Nubian Sandstone Aquifer System (NSAS) is one of the largest aquifer systems in the world, stretching over approximately 2.6 million square km across Chad, Egypt, Libya and Sudan. The riparian countries sharing the aquifer system face similar problems of arid climate, scarce surface water resources, persistent droughts and fragile ecosystems. The aquifer is thus a critically important source of water in this arid desert region and will be increasingly in demand in the future. All four countries have given priority to linking the NSAS groundwater exploitation to national development strategies and plans. However, management of the NSAS is challenging because of its enormous size and the large thickness of the geological formations that constitute the aquifer system. Growing pressures on the aquifer system poses threats to both the quantity and quality of the resource and could, if not appropriately managed, lead to transboundary/shared problems and tension. Within this context, the UNDP/GEF/IAEA/UNESCO “Formulation of an Action Programme for the Integrated Management of the Shared Nubian Aquifer” project (2005-2011) aimed at:

- Expanding, and consolidating the technical and scientific knowledge base regarding the NSAS,
- Developing and strengthening a joint Nubian Aquifer Management Framework that can guide the sustainable use of this important water resource and build transboundary cooperation,
- Developing links and networks between international and national organisations to ensure cooperation, to consolidate efforts and to assure complementarity,
- Initiating an appropriate public participation and communication plan to inform citizens in the region about the NSAS.

As a result of this project, a Shared Aquifer Diagnostic Analysis (SADA) was developed in 2010 to jointly identify, understand and reach agreement on the priority issues, threats and root causes of the NSAS. In addition, a Strategic Action Programme (SAP) to outline the necessary legal, policy and institutional reforms needed to address the priority threats and their root causes as identified in the SADA for the NSAS was prepared and endorsed by the four countries in 2013.

Against this background, this project aims at initiating regional SAP implementation through legal, policy and institutional reforms and addressing gaps identified in the SAP, supporting rational and equitable integrated management, socio-economic development and the protection of the ecosystem and resources of the NSAS in the four riparian countries. Since the SADA and SAP were prepared, valuable information and data have been generated, through the activities of national organizations as well as researchers and scientific institutions, and will serve as a basis for the activities that will be undertaken in the framework of this project.

1.2 Environmental context

General features of the NSAS

In view of the arid nature of the region, the NSAS is the only source of water available in the four countries for sustaining life and preserving the ecosystem outside the Nile Valley and Delta and

Chadian lakes. It is estimated that approximately 7 000 000 people depend on the NSAS groundwater resources for their daily activities.

The climatic conditions are influenced by the Mediterranean Sea to the North, and the Sahara desert to the South, resulting in an abrupt transition from one kind of weather to another. The Mediterranean coastal strip has dry summers and relatively wet winters (rainfall ranging from 100 to 500 mm). Moving southwards to the interior, desert climatic conditions prevail, with torrid temperatures and large daily thermal variations; rain is rare and irregular and diminishes progressively towards zero. Rainfall time-series data has shown a progressive increase in annual precipitation in the past 20 years, with the highest rainfall over the Tibesti, Ennedi, Erdi and Darfur mountains in Libya, Chad and Sudan.

Groundwater is mainly withdrawn by means of dug wells for domestic use and small-scale irrigation in the four countries, and deep boreholes for industrial use (mainly oil production in Libya and mining in Egypt) and large-scale irrigation in Egypt and Libya, and domestic water supply in Khartoum, Sudan as well as domestic water supply and water conveyance in Libya. The main crops cultivated are cereals (wheat, barley, and oats) and alfalfa, in addition to palm trees, olive trees, grapes, citrus and figs. Sheep, goats and camels are raised in the region. Groundwater natural background quality is generally good in the major part of the NSAS, except in the northern areas where the sandstones are overlain by carbonate rocks of the PNAS or extend to the coastal regions.

Extent and boundaries of the NSAS

The total area of the NSAS is approximately 2.6 million square km and comprises a lower part which ranges in age from Cambrian to the Pre-Upper Cenomanian (Nubian Aquifer System, NAS – approximately 1.7 million square km) and an upper one with an age of Upper Cenomanian to Recent (Post Nubian Aquifer System, PNAS - 900 000 square km). The NSAS underlies almost all of Egypt, the eastern part of Libya, and the northern areas of Sudan and Chad. The geographical extent of the NSAS is determined by the following boundaries:

- Eastern limit: A *no-flow* boundary formed by the impermeable Basement rocks of the mountain ranges along the Red Sea and the South Sinai;
- Southern limit: A *no-flow* boundary formed by the impermeable Basement rocks of the mountains of southern Sudan (Kordofan and Darfur blocks) and Chad (Tibesti and Ennedi), and a *fixed-head* boundary on the south eastern side formed by the Nile at Lake Nasser (Egypt) and Dongola (Sudan);
- Western limit: A *no-flow* boundary formed by the groundwater divide extending from the Tibesti mountains in the south and continuing northwards in Libya; and
- Northern limit: A *fixed-head* boundary that coincides with the Mediterranean coastline.

Geological setting of the NSAS

Regional uplifts and faults divide the NSAS area into several compartments that constitute individual groundwater basins. Earlier investigations have identified five major basins within the NSAS separated by major uplifts: Kufra, Dakhla, northwestern, Upper Nile Platform, and the Northern Sudan Platform. Subsurface information on these basins indicates significant differences in the thickness of the aquifer layers and their water-bearing characteristics. Two of them (Kufra and Dakhla) were considered high potential basins while the other three (northwestern, Upper Nile Platform, and Northern Sudan Platform) were thought to be of limited potential because of limited extension and/or thickness.

Recent studies are now focusing on the Northern Sudan Platform basin because of its potential as a source of present-day recharge to the system.

Groundwater storage

The total volume of fresh groundwater in storage in the NAS is estimated at 372, 950 billion cubic metre (BCM) of which 41.5% (154,715 BCM) is in Egypt, 36.6% (136,550 BCM) in Libya, 12.8% (47,807 BCM) in Chad, and 9.1% (33,878 BCM) in Sudan. About 70% of this reserve is in the unconfined parts of the NAS as a whole extending across all four countries while the remaining 30% is in the confined part, which exists beneath Egypt (90%) and Libya (10%). The bulk of groundwater stored in the aquifer system is either too deep to reach and abstract with the present techniques, or too salty to use, particularly in the northern areas. Therefore, only about 3.9% of the reserve (14,459 BCM) is recoverable at the present, bearing in mind more of the groundwater in storage could become recoverable with future advances in technology. Practically all the recoverable fresh reserve is in the unconfined parts of the NSAS.

Groundwater flow

The official hydrogeological map published by the Joint Authority (JA) of the NSAS shows that groundwater flow is generally from the southwest to the northeast. Delineation of this regional flow system was based on the result of groundwater models developed for the two large basins (Kufra and Dakhla) where historical development took place and gradually developed to heavy abstraction in the numerous oases scattered in these regions. These models considered the NSAS as multi-layered as one 'hydrogeological system' and treated the aquifer system as being hydraulically connected across the entire region despite the fact that it developed in a tectonically active zone and comprises two extensive aquifer systems, which have been deposited in different environments and display different water-bearing characteristics. This is probably why the majority of the groundwater flow models for the NSAS applied a simple piston flow system, a system that cannot account for the complexity of groundwater flow in such a huge multi-layered system and address the observed lateral and vertical variations in the lithological sequences of the two major units (NAS and PNAS) of the aquifer system. Major structural elements existing in the region, particularly faults and uplifts, in addition to the concentration of heavy abstraction in the oases, can obscure the groundwater flow direction by restricting and/or redirecting it and providing a preferred pathway. In the Bahariya oasis, for example, groundwater flow lines are directed from southwest to northeast as a general flow. In the Siwa oasis, the regional groundwater flow is interrupted by fault-related local flow systems.

Groundwater recharge

Geological and isotopic investigations conducted in the region since the early 1980s have shown that the extensive fresh groundwater stored in the NSAS had accumulated in the aquifer system from previous pluvial periods (that prevailed in the region as far back as eight hundred to one million years ago during the ancient Pluvial times), and that replenishment of the system at the present time, if any, is negligible. While such inferences are largely accepted, recent studies demonstrate that, locally, the NSAS is receiving modern recharge over areas of relatively high precipitation. In northern Sudan, where the NSAS consist of thin shallow sediments, chemical and isotopic evidence indicate that direct seasonal recharge of 0.3 to 3.45 mm/yr takes place through sand dunes and wadi deposits, and that present-day recharge from the Nile induced by pumping probably extends some 10 km on either side of the river and then drains to the north in response to regional gradients. It has also been reported that NSAS in the Sinai Peninsula is locally receiving modern recharge of $\sim 13.0 \times 10^6 \text{ m}^3/\text{yr}$. In the Tushka area, southeastern Dakhla basin, faults and other structural elements play an important role

in recharging the NSAS from Lake Nasser. While available studies suggest the occurrence of localized recharge, delineation of recharge areas throughout the vast areas of the NSAS would require the installation of rain gauging stations across the region, particularly in the elevated plateau and mountain areas where relatively high precipitation takes place. This is not the case at the present time and, hence, other suitable and possible investigations need to be pursued (e.g. satellite-based rainfall measurements).

Groundwater dependent ecosystems in the NSAS

Oases are of vital importance to sustain local populations in remote arid areas away from the Nile (i.e. subsistence farming and animal raising) and form a natural habitat for a variety of animals, insects, birds, reptiles and some aquatic species within lakes. They provide food, shelter and suitable environment. The near-surface water table in the oases allows for the growth of rare and distinct plants that adapt to the harsh climatic conditions and high salinity of water and soil. Limited data on the condition of terrestrial and oases ecosystems is available and there is a need to identify endemic species at risk and develop a prioritized biodiversity inventory. It has however been reported that a number of species dependent on the oases for survival has diminished.

A number of national activities have been undertaken towards a better understanding of the NSAS. Some of these activities addressed specifically the ecosystem of the oases, such as the GEF Project (Chad) and the Conservation of Medemiaargun and Nubian Desert Oases Biodiversity (Egypt). The majority of studies, however, were of hydrogeological nature executed through both national studies and regional projects over the past 30 years. Only one project (Groundwater Modelling Programme at the Research Institute for Groundwater Studies, RIGW) has been reported to be still ongoing until 2018.

1.3 Socio-economic context

Groundwater dependence

Around 110 million people live in the NSAS area. Most of the population is concentrated in the Nile Valley and Delta and depend on the Nile River as the main source of water supply for domestic, irrigation and industrial use. Moving further away from the Nile Valley and Delta, the NSAS is the only source of water available in the four countries for sustaining life and preserving the ecosystem. The area is mostly characterised by traditional farming system (i.e. subsistence farming and animal raising) in the vicinities of the oases, and population is either settled in villages or nomad and semi-nomad, practicing seasonal movement of stock after grazing. It is estimated that approximately 7,000,000 people depend on the NSAS groundwater resources for their daily activities (43% in Sudan, 29% in Libya, 27% in Egypt, and 1% in Chad).

Groundwater use

It is estimated that around 4.12 BCM are abstracted annually from the NSAS. In the scattered oases and villages, groundwater is withdrawn by local population by means of dug wells for domestic use and small-scale irrigation in the four countries. The main crops cultivated are cereals (wheat, barley, and oats) and alfalfa, in addition to palm trees, olive trees, grapes, citrus and figs. Sheep, goats and camels are raised in the region. While groundwater is almost entirely used for agriculture in Chad, the groundwater use breakdown varies among the other countries as deeper boreholes are used. Deeper boreholes are used for industrial use and large-scale irrigation in Egypt and Libya, and domestic water supply in Khartoum, Sudan and for water conveyance to coastal areas in Libya as well as domestic

water supply in the oases. Main industrial activities consist of mining (phosphate), chemical industries and water bottling industries in Egypt, and oil production and water bottling in Libya.

In Egypt, annual abstraction from the NSAS nowadays is around 2,450 MCM and accounts for approximately 23% of total groundwater abstraction in the country. In Libya, around 970 MCM are abstracted annually for agriculture (50%), industrial use (15%) and domestic use (35%). It is estimated that around 20% of total groundwater abstraction from the NSAS is transported outside the basin to meet domestic water demand in coastal areas. In the Sudanese portion of the NSAS, groundwater is mostly used for domestic water supply in Khartoum. Greater Khartoum is currently supplied about half by groundwater from the NSAS and half by water extracted from the Nile River. In total, groundwater abstraction in the Sudanese portion of the NSAS is around 700 MCM/yr. Groundwater abstractions in Chad remains marginal concerning the other countries.

1.4 Prevailing groundwater management issues and threats to be addressed

The SADA identified five transboundary and/or shared groundwater management issues and threats to be addressed:

Transboundary/ Shared Problems	Immediate, underlying and root causes
Declining Water Levels	Accelerated water level decline is directly related to abstraction, so the immediate cause of any associated problems would be excessive abstraction from the aquifer. Since the primary use for abstracted water is agricultural irrigation, the underlying causes would be related to demands related to the expansion of agriculture, and intensified by issues of efficiency and conservation. Examples of inefficiency are technical and managerial shortcomings and pumping water in excess of demand for various reasons. The root cause is population growth, which implies increasing water demand for all purposes, and may affect institutional decisions regarding food security, and consequently agricultural water demand.
Damage or Loss of Ecosystem and Biodiversity	The immediate causes of impairment to ecosystem health and losses in biodiversity are different for aquatic and terrestrial ecosystems. For the oasis ecosystems, the immediate causes are water level decline and water quality deterioration, which can occur either separately or in concert. The underlying causes are similar to previously described impairments: over-abstraction resulting in declining water levels and inadequate pollution prevention practices resulting in water quality deterioration. The root causes are expansion in agricultural and industrial sectors due to population growth and related to decisions on food security. For terrestrial ecosystems, the immediate cause is decline in rainfall, and the root cause is climate change.
Water Quality Deterioration	The immediate causes of water quality deterioration are pollution, salinization, and disturbed water balance. These causes are of a technical

Transboundary/ Shared Problems	Immediate, underlying and root causes
	nature. The underlying causes are agricultural and industrial growth and improper waste disposal leading to aquifer contamination. The root causes of water quality deterioration are the increase in agricultural and industrial development, related to the combination of increased population and national decisions related to food security priorities.
Climate Change	Global and not reviewed for the SADA or SAP
Changes in Groundwater Regime	The immediate cause of change in groundwater regime is a drop in water levels. The underlying cause is over-abstraction, which is aggravated by unmanaged water use and exploitation. The root causes are again the growth in agricultural and industrial sectors due to population growth and related to decisions on food security.

Increased abstraction is raising concern, as it would have negative effects on the ecosystem and biodiversity of the system. Between 2006 and 2016, groundwater abstraction has increased considerably in Egypt (from 506 MCM to 2,450 MCM/yr), Libya (from 831 MCM to 970 MCM/yr), and Sudan (due to the increase of Khartoum’s population). All four countries also have concerns related to the impacts of drawdown on the oases ecosystem, which sustains the local populations in remote arid areas. Groundwater level decline and water quality deterioration could lead to possible environmental deterioration that can affect 1) biodiversity, particularly in the northern coastal areas of Egypt, where flora and vegetation suitable to feed wild animals are found, and 2) soil moisture in the unconfined part of NSAS south Latitude 24 at Aswan Governorate and East Oweinat Project (25% of NSAS area in Egypt). In Chad, many animal species have disappeared from the "Fada Archei Wildlife Reserve", which has been abandoned since the 1980s due the combined effect of drought, wars and uncontrolled game hunting. In Libya, the impact will be on the growth of most natural plants and non-irrigated trees (mainly palm trees), the drying of water bodies such as small sabkha (which leads to the migration of some of the animal species that live on them), and land subsidence. In Sudan, drawdown will affect the water table and decrease the amount of water for the population livelihood and for the few domesticated wild animals. From the socio-economic perspective, extensive drawdown would require deeper drilling and higher production cost, usually beyond the financial capacity of individuals. This would adversely affect the economic feasibility for the development projects. The inevitable result would be the mass migration of local population and a severe damage of the ecosystem and loss of biodiversity.

Desertification, political conflicts and uprising have been reported as important barriers to the sustainable management of the aquifer system at the present time. In Sudan, the number of population (animal and human) in the NSAS area away from the Nile is diminishing since 2003 due to instability in the area. The countries’ perception of long-term solutions to such barriers included: financial support for the execution of water supply schemes for the localities that are in the base-flow areas such as Hamdjaras, Bahaï (Chad) and executing capacity building programmes for the water management staff in parallel with the strengthening of national and regional institutions (Egypt).

As noted in the SADA, climate change concerns are cross-cutting and may result in additional pressures through, for example, migration or conflicts between nomadic herders and pastoral farmers. Climate

change, in the form of higher temperatures and more arid conditions, can affect water resources in the region in several ways. Higher evaporation and transpiration in oasis and sabkha areas will increase, but will not affect the water budget in any significant way.

The identified issues and threats are compounded by problems including: financial constraints, lack of the trained staff for joint management, transportation difficulties in remote desert areas, shortage of field equipment suitable for monitoring and measuring climatological, hydrological and hydrogeological parameters required for joint management, and absence of laboratory facilities for isotopic analysis.

Definitions

Aquifer means a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation.

Aquifer system means a series of two or more aquifers that are hydraulically connected.

Transboundary aquifer or **transboundary aquifer system** means, respectively, an aquifer or aquifer system, parts of which are situated in different States.

Aquifer State means a State in whose territory any part of a transboundary aquifer or aquifer system is situated.

Utilization of transboundary aquifers or aquifer systems includes extraction of water, heat and minerals, and storage and disposal of any substance.

Recharging aquifer means an aquifer that receives a non-negligible amount of contemporary water recharge.

Recharge zone means the zone, which contributes water to an aquifer, consisting of the catchment area of rainfall water and the area where such water flows to an aquifer by run-off on the ground and infiltration through soil.

Discharge zone means the zone where water originating from an aquifer flows to its outlets, such as a watercourse, a lake, an oasis, a wetland or an ocean.

Definitions above are from the: The Draft Articles on the Law of Transboundary Aquifers, annexed to Resolution 63/124 adopted by the United Nations General Assembly in December 2008

Aquitards means a formation of semi-pervious rock that can store water. It can also transmit enough water to be significant in the regional migration of groundwater, but not enough water to supply individual wells. It retards but does not totally prevent the flow of water to or from an adjacent aquifer.

Aquicludes means a saturated bed, formation or group of formations that yield inappreciable quantities of water to drains, wells, springs and seeps.

Groundwater basin means a physiographic unit made up of one large aquifer or several connected or interrelated aquifers. The water in a groundwater basin flows to a common outlet and is delimited by a groundwater divide.

From: UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. Inventory of Shared Water Resources in Western Asia. Beirut

1.5 Long-term solutions and barriers

Although the Nubian countries have made great advances in understanding the condition of the aquifer and the linkages between potential changes in the aquifer and responses of environmental and human systems, much work remains. Previous work undertaken by the countries led to the development of the Strategic Action Programme (SAP) that highlighted the technical, management and governance issues to address the barriers that were identified in the Shared Aquifer Diagnostic Analysis. The implementation of the SAP remains a challenge and this project, to *initiate* the implementation of the SAP is a crucial step in progressing solutions to address the barriers.

1.6 Stakeholder analysis

A detailed stakeholder analysis, the interests of the stakeholders and the relative power or importance of the stakeholders was undertaken and reported in the SADA/SAP. This work was undertaken by a working group that defined a list of stakeholders and interests and reviewed both the primary stakeholders (those who are ultimately impacted by the activities of the project, e.g. farmers, local tribes, etc.) and secondary stakeholders (e.g. government departments, NGOs, private sector organisations).

Updates from the SADA/SAP analysis were provided as indicated below by the national consultants during the project preparation. Due to lack of timing and resources during the project preparation, an in-depth stakeholder analysis will be carried out during the inception of the project.

- Chad: The Government at the time of drawing up the SAP in 2013 referred to the "Ministry of Rural Hydraulics; in 2014 it was renamed the "Ministry of Livestock and Hydraulics "and is currently named the "Ministry of Water and Sanitation. The local management committees of lakes Ounianga, the inter-ministerial scientific committee for the management of lakes Ounianga. A project, financed by the AFD, is being carried out by national researchers to better understand the lacustrine system of the lakes Ounianga. Ministry of Irrigation, Production and Agricultural Equipment, Ministry of Culture, Ministry of Higher Education and Scientific Research.
- Egypt: Ministry of Water Resources and Irrigation (MWRI), the National Water Research Centre NWRC, the Desert Research Center, Academy of Science Research and Technology, NSAS Cairo office, Ministries of Health, Agriculture,, Housing, Industry, Tourism, Environment, NGOs (Water Use Associations, Water Boards, Land Reclamation associations, Environment Protection associations , Egyptian Woman Council, AYB – AlashanekYaBalady), Private companies (Land Reclamation , Agricultural Project Managements, Well Drilling, Groundwater Bottling, Energy Production and Distribution, Touristic & Management, Garbage Collection and Recycling, Water Treatment and Desalination, Agricultural Development Bank).
- Libya: National/Governmental: The General Water Authority, The Great Man Made River Authority, The General Company for Water and Wastewater, The Desalination company, Ministry of Planning, Ministry of Agriculture, Ministry of Utilities and housing, The Environmental General Authority, Ministry of industry, Ministry of Foreign Affairs, Agriculture Research centre (ARC), Academia, Universities. National /Non-governmental: Local tribes, Agriculture Cooperative Assemblies, Private Engineering consultancy, civil society, and Water contractors.
- Sudan: Ministry of Water Resources, Irrigation and Electricity, General Directorate of policies, planning and projects, General Directorate of the the Nile affairs and dams, General Directorate of Groundwater and Wadi's, General Directorate for Financial and Human Affairs, General Directorate for Operation and Maintenance, Hydraulic Research Center, Water

Resources Technical Organ, Dams Implementation Unit (include Water Harvesting and UNESCO Regional Category ii Center for Capacity Development and Research in Water Harvesting), Drinking Water and Sanitation Unit (include Training Center), National Water Research Center, Ministry of Agriculture and Physical Planning and Public Utilities, communities, private sector

There is widespread use of different approaches to engage stakeholders in the countries including local meetings, awareness raising events, water associations and water boards/councils. Details of key stakeholders and their involvement in this proposed project are presented in section 4.5.

1.7 Baseline analysis

This section provides a summary of the key national and regional policies and institutions involved in managing the NSAS and a brief overview of national and regional actions that have been undertaken to understand the properties and threats to the aquifer.

1.7.1 National and regional policies

A **Joint Authority** for the Study and Development of the Nubian Sandstone Aquifer System was established between Egypt and Libya in 1989 and was formally launched in 1992¹. The agreement providing “Constitution of the Joint Authority for the Study and Development of the Nubian Sandstone Aquifer Waters” was adopted in 1992. Sudan joined the Joint Authority in 1996². Its accession to the Joint Authority was formerly approved by the Council of Minister resolution No. /81/at 1997³. Chad was invited to attend as an observer a meeting of the Joint Authority in 1998, and was then officially invited to be an active member of the Joint Authority⁴. In March 1999, Chad officially joined the Joint Authority⁵.

Agreements on monitoring and data exchange

In the frame of the first project on the Nubian aquifer, executed by CEDARE, two agreements were prepared and approved by the Directors in charge in the four countries (Tripoli, 5 October 2000).

The first agreement is related to the “Terms of reference for the monitoring and exchange of groundwater information of the Nubian Sandstone Aquifer System”. In this agreement, the four countries, Chad, Egypt, Libya and Sudan agree to exchange the data consolidated through the project, and included in the information system NARIS, which had been achieved, as well as information related to socio-economic aspects, meteorology, drilling experiences, and data agreed upon in the second agreement.

¹ Salem O., Tripoli III Conference

The National Legal Report of Libya mentions « Minutes of July 1991 creating the Joint Authority between both countries. The National Legal Report from Egypt mentions the minutes of the first session of the Egypt-Libyan Joint High Committee (6-8 July 1991) regarding the establishment of the JA.

² Khater A., oral presentation, The 5th Biennial GEF International Waters Conference

³ National Legal Report of Sudan

⁴ Regional Strategy for the Utilisation of the Nubian Sandstone Aquifer System, vol IV Administration.

⁵ Regional Strategy for the Utilisation of the Nubian Sandstone Aquifer System, vol IV Administration

The second agreement is related to monitoring and data sharing. In this agreement, the four countries decide to monitor and exchange the following information:”

- Yearly extraction in every extraction site, specifying geographical location, and number of producing wells and springs in each site
- Representative Electrical Conductivity once a year
- Water level measurements, twice a year

The agreed SAP Vision for the NSAS

To assure rational and equitable management of the NSAS for sustainable socio-economic development and the protection of biodiversity and land resources whilst ensuring no detrimental effects on the shared aquifer countries.

Since the SADA and SAP were prepared Chad, Egypt, Libya and Sudan identified the following changes within national policies:

- Chad: A National Water and Sanitation Master Plan is in place, which is being updated. A Water Code and an Environment Code are in the statute book; however, implementing legislation is required to bring the Codes into full effect, including enforcement. Implementing texts of this law include: Law No. 006 / PR / 2013 of April 22, 2013 establishing the National Laboratory of Water (LNE); Decree No. 330 / PR / PM / MEH / 2014 of 20 January 2015 defining the conditions for the transfer of powers from the State to the Decentralized Territorial Authorities for the delegation of the public drinking water service; the Decree No. 003 / MAE / SG / 2017 of 18 January 2017 defining the model framework of a specific contract for the Delegation of the Public Drinking Water Service to a User Association or a Private Farmer; Decree No. 030 / MEA / SG / 2016 of 30 December 2016 defining the model framework for the delegation of the Public Water Service and the perimeter of authority to the Decentralized Local Authorities; Order No. 031 / PR / MEA / SG / 2016 of 30 December 2016 defining the criteria for selecting an operator for the operation, maintenance and development of drinking water supply systems. The IWRM policy has been put in place and exists as a simple roadmap.
- Egypt: A Groundwater National Plan is due for release in December 2017, updated from the latest (2012) edition. The Plan is due for an update at five-year intervals. The groundwater licensing system in effect provides stakeholders with the security of title necessary to get the energy and marketing to improve their income. Nevertheless, a review and adjustment of the water resources abstraction & use legislation is due for the proper implementation of the water policy. A new Water Resources Law is under preparation, the first draft of which was released in January 2017. The new Water Resources Law must pay attention to the issue of shared water resources, in view of their paramount significance to Egypt.
- Libya: No new policies have been adopted since the SADA/SAP. The National Water Strategy (2000 – 2025) needs to be revised and updated to include guidelines on complementary issues such as climate change and ecosystems. In addition, the review and update of the water legislation is overdue. In particular, a review of the existing legislation and introduction of appropriate clauses on water abstraction, water use and protection, taking into consideration the guidance provided in the UN Draft Articles on the Law of Transboundary Aquifers for bilateral and regional agreements and arrangements for the proper management of the NSAS,

would be necessary to deal with new projects (especially agricultural) that require substantial abstraction for prolonged periods of time or have potential for water quality deterioration,.

- Sudan: Three new regulations, in addition to the Nile Pumps Control Regulations 1951, Irrigation and Drainage Act 1990 and Water Resources Act of 1995 were approved in 2016: Regulation for Groundwater control, Regulation for Irrigation and Drainage, Regulation for surface water control. The Gizera Scheme Act of 2005 was updated in 2014.

1.7.2 National and regional institutions

Since the development of the SADA and the SAP the following national changes to institutions involved in the NSAS have been highlighted:

In Chad, water is the province of the Ministry of Water & Sanitation – formerly Ministry of Rural Hydraulics, re-named in 2014 Ministry of Livestock and Hydraulics. An Environment Ministry is tasked with the implementation of the national environmental policy. A National Inter-ministerial Multi-disciplinary Scientific Committee is in place for the Ounianga lakes. At field level, the Ounianga lakes are in the care of a local committee established by a Government decree of 12 September 2011. The Joint Authority in Chad is attached to the Water & Sanitation Ministry, and is funded by the Government. In actual practice, however, the Government has not been able to provide funds to the Authority.

In Egypt, the Ministry of Water Resources and Irrigation (previously, the Ministry of Public Works and Water Resources) is mandated to control and manage all fresh water resources, including the surface and subsurface water. In addition to construction, supervision, operation, and maintenance of all the irrigation structures and drainage networks, the Ministry is also responsible for providing all other sectors with good-quality water, in due time. A Supreme Committee for Groundwater Licensing operates under the direction of the Minister of Water Resources, with representation of the Ministries of Agriculture, Environment, Health, Tourism and industry. The committee holds monthly meetings. A similar Committee is acting for Nile Water and Horizontal Expansion. The Joint Authority in Egypt is attached to, and hosted by, the Research Institute for Groundwater (RIGW) in the National Water Research Centre (NWRC), under the Ministry of Water Resources and Irrigation.

Libya has undergone major institutional changes since 2011. As a result, a Ministry for Water Resources was established in 2012 that encompasses all relevant sectors including the Great Man-made River Project (GMRP), the Company for Water and Wastewater, the General Water Authority (GWA) and the General Company for Desalination. The Ministry was later reduced to a General Authority status with the same mandate. GWA continued to perform its duties as before and oversees the NSAS region through its Kufra & Sarir Branch. The data collection campaigns have witnessed remarkable slow down as a result of the emerging security situation. Shortage of funds and lack of security along with political instability has affected the other sectors to varying degrees. As regards the JA in Libya, GWA is the primary link with the JA in terms of data supply and personnel. GWA maintains a branch called the Kufra & Sarir (or Zone 5) which covers the NSAS extension in Libya. The branch is responsible for conducting hydrogeological studies, drilling activities, monitoring the piezometric network and recording water abstraction from main agricultural projects and the GMRP water conveyance project. The Joint Authority is funded by the government through the annual budget allocated to GWA. The JA is hosted by Libya and shares part of the GWA premises (Zone 5 branch) and therefore benefits from the facilities, vehicles, equipment, personnel and the database of GWA.

In Sudan, the Ministry of Water Resources Irrigation and Electricity (MWRIE), the Ministry of Local Government and the Ministry of Environment have the bulk of responsibilities as regards the country's water resources. There is a national NSAS Office within the MWRIE. This office is responsible for data and information collection and sharing through the Joint Authority. However, the activities of this office lack adequate funding and support. At the Joint Authority in Sudan, a national co-ordinator is now in place to oversee and ensure proper linkup of the Authority with the national Sudanese institutions.

Inter-ministerial / inter-sectoral committees

The project will contribute to enhance the cooperation and coordination between ministries. Inter-ministerial structures will be strengthened.

In the NSAS countries, inter-ministerial structures are used for providing cross-ministerial involvement in water management, including:

- Chad: There is a local organizing and implementation committee responsible for implementing the activities of the management plan for the sites of Lake Ounianga. The national inter-ministerial and multidisciplinary scientific committee responsible for the implementation and monitoring of activities related to the protection of the Lake Ounianga site. The regional delegation of the Ministry of Water and Sanitation and the regional delegation of the Ministry of Environment and Fisheries.
- Egypt: The Supreme Committee for Groundwater Licensing directed by the Minister of Water Resources and shared by the head of water sectors and representatives of Ministries of Agriculture, Environment, Health, Tourism and industry. The committee holds monthly meetings. Similar Committee is acting for Nile Water a Horizontal Expansion.
- Libya: No permanent committees are established but ad-hoc committees on long or short-term basis are frequently formed to plan the location, size, and water requirements of major projects. In addition to the General Water Authority, such committees or work groups include all concerned Ministries such as, notably, the Ministry of Agriculture, the Man-made River Project Authority, the Ministry of Petroleum, the Ministry of Utilities
- Sudan: There are a number of water-management committees. A Water Resources Council, reporting to the Minister of Water Resources co-ordinates with other government agencies at a high level. An Active WASH programme, led by UNICEF and WHO, includes national NGOs and other international organisations. UNESCO is establishing a network for water professionals to enable information co-ordination between all water sector stakeholders in Sudan

1.7.3 National projects

National projects and studies relevant to this project include:

Chad: The network project, which mapped the area, stratigraphic, petrographic and isotopic studies, the GEFT project that studies lake environments, the MENA water project that has been doing geophysical prospecting in the area, Amdjara, baobilia and moutougouni within the framework of the protection of the environment, the Ministry of Culture which makes awareness of the management of the Ounianga lakes. On oasis ecosystems, the GEFT project and some projects of the University of Berlingue will be relevant. NGO of international law called AFRICAN PARKS, which intervenes in the Ennedi for the protection of the wild fauna.

Egypt: The National Water Research Centre's Research Institute for Groundwater (RIGW) has a long history of research and development of groundwater resources in Egypt, including: Hydrogeological Mapping programme in Egypt (1986–2017); Environmental management of groundwater; Exploration and prospecting of the Groundwater aquifers in Egypt using the Geoelectrical, Electromagnetic, Magnetic, Ground Penetration Radar and TEM to investigate the sub surface hydrogeological boundaries and the aquifer geometry; Groundwater Modelling Programme in Egypt, 1986-2018. In addition, of relevance to this project, they have prepared a number of publications of relevance to oasis ecosystems have been available⁶.

Libya: Drilling activities in the NSAS zone for water supply or oil exploration contribute to the understanding of the geological and hydrogeological conditions and provide invaluable data for mapping the aquifers and updating the state of knowledge on hydraulic parameters, piezometry, water quality and flow patterns. Data collection from the existing piezometric network is still conducted by GWA and GMRP technicians despite the prevailing conditions, along with documenting the abstraction rates from the major wellfields (GMRP wells, agricultural and municipal wells and occasionally oilfields service wells). GWA maintains a digitized GIS database for all wells in the area along with periodic water level measurements and water quality analyses and abstraction rates. Such data will form an essential input to the SAP implementation stage.

1.7.4 Regional projects

An important advancement in the management of the NSAS was the establishment of the Joint Authority for the Study and Development of the Nubian Sandstone Aquifer System. Over the past 15 - 20 years, there have been a number of initiatives to improve the understanding of the NSAS through the CEDARE with IFAD resources, assistance from the IAEA and the UNESCO, and most recently from the GEF through UNDP that led to the SADA and the SAP.

The CEDARE project resulted in a joint survey of the socio-economic development policies and plans in the aquifer areas and the establishment of a NSAS Regional Information System (NARIS) database. NARIS was envisioned to facilitate data storage, processing, display and analysis and would provide input files for geographic information system (GIS) and mathematical models. The groundwater modelling efforts have been well documented (CEDARE 2001) and provide indications of the impacts on water levels and water quality over a period of 60 years of development and abstractions.

The Joint Authority (JA) and the CEDARE programme made important advances in regional cooperation that resulted in an improved understanding of the aquifer system and established mechanisms for data sharing and groundwater monitoring and modelling⁷.

Since 2003, the GEF has been supporting a regional technical cooperation project to facilitate and promote the development of a framework for the optimal management and use of the NSAS among

⁶Conservation of Medemiaargun and NubianDesert Oases Biodiversity in Egypt, Conservation Leadership Programme, CLP,Project ID: 080208, 2008-2010. El Hadidi, M.N., 2000. Flora Aegyptiaca. Vol. 1. Palm press, Cairo, Egypt. El Hadidi, M.N. and A.A. Fayed, 1994/95. Materials for Excursion Flora of Egypt (EFE). Taekholmia, 15: 233. Girgis, W.A., M.A. Zahran, K. Reda and H. Shams, 1971. Ecological notes on Moghra Oasis, Western Desert, Egypt. A.R.E., J. Bot., 14: 147–55.

⁷Constitution of the Joint Authority for the Study and Development of the Nubian Sandstone Aquifer 1992; Agreement #1: Terms of Reference for the Monitoring and Exchange of Groundwater Information of the Nubian Sandstone Aquifer System, entered into in October 2000; and Agreement #2: Terms of Reference for Monitoring and Data Sharing, entered into in October 2000.

the Nubian system countries. This technical cooperation project, has helped improve the overall understanding of the NSAS and to set the basis and laid the groundwork for a partnership of the GEF, UNDP, UNESCO and IAEA to work with member countries to strengthen regional cooperation, address data gaps, improve the technical understanding of the NSAS, and develop policy strategies for managing the aquifer system. This partnership led to a broader Nubian project launched in 2006 as a UNDP-GEF MSP *'The Regional Formulation of an Action Programme for the Integrated Management of the Shared Nubian Aquifer'*, that, jointly with responsible national institutions, delivered a Shared Aquifer Diagnostic Analysis and developed a Strategic Action Programme which has been technically approved and endorsed by the Nubian Sandstone Aquifer System Ministers with responsibility for water and the environment from the four countries and the Chair of the Joint Authority of the NSAS on 18th September 2013 in Vienna⁸. The SADA undertook a detailed analysis of the key-shared problems, stakeholders and governance/management arrangements of the NSAS. The SADA included details of the use of both groundwater and surface water usage in each country.

UNESCO-IHP and United Nations Economic Commission for Europe (UNECE) are currently undertaking joint activities in order to promote the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), which aims to protect and ensure the quantity, quality and sustainable use of transboundary water resources by facilitating cooperation. In November 2012, the Parties of the Convention adopted a Resolution recognizing UNESCO expertise in the subject of transboundary aquifers and strengthening their cooperation for the promotion of the Water Convention and its Model Provisions on Transboundary Groundwaters. These provisions are based on the principles of the Draft Articles of "The Law of Transboundary Aquifers" (UN Resolution 63/124, December 2008). The Water Convention is a global instrument open to all countries since February 2013. Joint activities include trainings and workshops on the concepts included in these legal instruments and on the promotion of cooperation for the management of shared water resources.

In addition to the previous UNDP-GEF project on the NSAS, the **IAEA** has also undertaken a range of technical co-operation activities within specific countries and the region, including: supporting water resource planning (*Building capacity in support of regional and sub-regional water resources planning, development and management in Africa*); and pollution monitoring (*Contribution of isotopic and hydro-chemical techniques to assess sources of pollution in shallow groundwater basins - Sudan*).

The approaches used by UNDP/GEF in characterizing the aquifer and developing management action plans (SADA/SAP) and utilizing modelling techniques for the NSAS are applicable to other aquifer systems.

The project will also work with regional World Bank supported groundwater initiatives in Southern Africa⁹ and the recent GEF Sahel Groundwater project, that are supported with the results from the GEF Global Groundwater Governance project that will also assist this project under Activity 2.2.3.

⁸<http://www.thegef.org/gef/node/9925>

UNDP press release: <http://www.undp.org/content/undp/en/home/presscenter/pressreleases/2013/09/18/four-african-nations-agree-to-water-management-programme>

IAEA press release: <http://www.iaea.org/newscenter/pressreleases/2013/prn201314.html>

video link to ceremony: <http://www.youtube.com/watch?v=mbIDpxEtdwY>

⁹ <http://projects.worldbank.org/p070547/groundwater-drought-management-sadc-project?lang=en>
<http://projects.worldbank.org/P127086/sustainable-groundwater-management-sadc-member-states?lang=en>

1.7.5 Baseline conclusions

Without further support, the goal of the endorsed SAP will not be achieved within the NSAS. While there have been significant advances in the understanding of the hydrogeology of the NSAS there is still a need to develop and enhance capacity to assess and protect the ecosystems dependent on the water resources of the aquifer, in particular to mitigate the potential impacts of climate change and variability within the region. In addition, the Joint Authority needs further strengthening to develop and implement effective management actions (including a regular monitoring programme). Further work through pilot demonstration activities will assist the four governments in collaborative actions that will both strengthen their capacity on environmental management and improve the livelihoods of the local population dependent on the resources of the NSAS.

2 STRATEGY

The NSAS is a large regional aquifer system shared by four countries and managed nationally by the responsible water departments. A regional entity, the Joint Authority has been established in 1992 'for the Study and Development of the Nubian Sandstone Aquifer Waters', to enable operationalization of the coordination between the countries. A comprehensive study of the hydrogeological conditions of the NSAS was conducted in the period 1998–2001. The study recommended to carry out further studies and modelling to address water quality issues and environmental impacts and to enhance cooperation through legislative and institutional mechanisms, expand the regional monitoring network with emphasis on possible interferences across boundaries and to maintain and update the information system and the model.

To fulfil the above recommendations, the previous UNDP/GEF project that led to the development of the SADA/SAP (*Formulation of an Action Programme for the Integrated Management of the Shared Nubian Aquifer*) was launched in 2006 to identify priority issues, threats and root causes of the NSAS through causal chain analysis. A SAP was prepared to outline the necessary legal, policy and institutional reforms needed to address them with focus on the environmental aspects. The priority shared risks, challenges, and problems include declining water levels, water quality deterioration, damage or loss to ecosystems and biodiversity, changes in groundwater regime, and climate change. The SAP was endorsed by the relevant ministers from the four countries in September 2013, and its implementation in the coming years, was considered essential for the rational and equitable management of the NSAS.

The SAP and equipment

The ability to monitor and model the NSAS is recognised as a necessity in the agreed SAP, both to implement the SAP and the long-term assessment of the impacts of implementation.

Groundwater monitoring equipment is needed for the successful initiation and implementation of the SAP through the activities planned in several components of the project and in particular in the national pilots (Components 1, 2, 4, and 5). Analytical and field equipment, furniture and office supplies will be purchased following standard UN procurement procedures. The related costs are clearly listed in the budget in page 76-80. UNESCO will also consider the project's co-financing resources provided by the non-country partners to procure further essential equipment for the project activities including training and capacity strengthening. Monitoring tools and related equipment will be used for activities detailed in Component 5 to assist in undertaking 'assessment studies' on priority investments. Most of the monitoring equipment will be procured through Component 4; and computers/software will be procured through Components 1, 2 and 4. In addition, if further equipment is required to assure the long-term project ambition of supporting the needs of the SAP, the project and partners will identify potential funding resources, from within their organisations and other funding/donor agencies, leading to additional co-financing resources

In accordance with best practices for IWRM, this regional project is assisting the four Nubian countries to initiate the implementation of the endorsed SAP to strengthen the joint management of the NSAS and lead to a rational and equitable management of the NSAS to the benefit of the ecosystems, economies and the population of the region. The project will further strengthen the function and role of the Joint Authority in its regional management of the shared aquifer in support of the four Nubian countries.

The project will initiate a number of actions to validate the SAP proposed approaches through pilot demonstration activities and work with national and regional authorities to implement changes in governance, policies and practices that will result in improved capacities (technical and management) in order to deliver the expected objective of this project. The project will also address some of the gaps that were identified in the development of the SAP, including: (i) NSAS hydrological status (the lack of data for most of the aquifer) and further analysis using isotopic age dating and other advanced hydrogeological techniques, that will further improve the model's performance; (ii) Improving both the capability and capacity to undertake ecosystem assessment and vulnerability of the region's oases to provide improved management guidance to mitigate the impacts of abstraction and development; and, (iii) to develop agreed common approaches to assessing and managing the impacts of climate change on grasslands and aquatic ecosystems of oases.

Although there have been to-date no observed transboundary impacts from abstraction from the aquifer, (which may be the result of model or monitoring limitations), the implementation of the SAP presents a unique opportunity to create shared management strategies oriented around prevention of possible conflicts. The risk of direct transboundary effects is low, but is sufficiently large to merit vigilance through improved and co-ordinated monitoring and data sharing. The region is also in a position to take advantage of the existing framework of the Joint Authority to cooperate in shared management of the aquifer to minimize the risk of adverse impacts from national activities.

At the project inception phase, as well as during execution, the PMU and the countries will evaluate the regional, national and local specific needs for training material, field studies and monitoring equipment and office supply. Considering the need to secure the most high-level standard for the purchasing of equipment for field studies, monitoring and the implementation of the pilots, the UNESCO's offices in the region will secure close coordination with national institutions. This will better allow to fulfil necessary UN procurement procedures and to give priority, when possible, to the purchase of equipment, office supply and other miscellaneous material at local level.

2.1 Project rationale and policy conformity

This project addresses both GEF 6 IW Objective 1: '*Catalyse sustainable management of transboundary water systems by supporting multi-state co-operation through foundational capacity building, target research and portfolio learning*' and IW Objective 2: '*Catalyse investments to balance competing water-uses in the management of transboundary surface and groundwater and enhancing multi-state co-operation*'. In undertaking this planned project to initiate the implementation of the agreed SAP, contributions will be made to four outcomes associated with these Objectives, including:

- Outcome 1.2 (*On the ground demonstration actions implemented, such as in water quality, quantity, conjunctive management of groundwater and surface water, fisheries, coastal habitats*);
- Outcome 3.1 (*Improved governance of shared water bodies, including conjunctive management of surface and groundwater through regional institutions and frameworks for co-operation lead to increased environmental and social benefits*);
- Outcome 3.2 (*Increased management capacity of regional and national institutions to incorporate climate variability and change, including improved capacity for management of floods and droughts*); and,
- Outcome 4.1 (*Increased water/food/energy/ecosystem security and sharing of benefits on basin/sub-basin scale underpinned by adequate regional legal/institutional frameworks for co-operation*).

The project is considered by the countries to offer important and Global Environmental Benefits (GEBs) through the actions to improve the NSAS governance and management involving a wide range of stakeholders, including:

- GEBs arising from enhanced aquifer management of the shared resources through a strengthened JA and national authorities that will deliver livelihood and ecosystem benefits
- Reducing demand through the application of measures to use the water resources of the NSAS more efficiently
- Reducing pressure on other national and transboundary water resources where available (e.g. Nile River)
- Flow of data including on water levels, abstraction rates and water quality
- Assessment of the fragile ecosystem
- Sharing experience on common issues through carefully selected pilot projects
- Strengthening of the JA and its national offices
- Training of personnel from the JA and the countries in different fields
- Awareness raising among the relevant institutions and the public at large on the environmental issues and the threats of climate change on the ecosystem and biodiversity
- Improving the institutional and legal system to achieve a rational management of the shared groundwater resources
- Introduction of suitable agricultural practices and water conservation techniques

The benefits from this project will also contribute to other multi-lateral environmental agreements including the Ramsar Convention, Agreement on the Conservation of African-Eurasian Migratory Water Birds, etc. dependent on the water resources available at oases fed by the NSAS.

2.2 Country ownership

The overarching regional strategy has been adopted by the four countries is the NSAS SAP which is aimed at protecting the water resources and the dependent ecosystems that will also enhance the livelihoods of the regional population. In the preparation of the regional SAP all four countries initiated the development of National Action Plans (NAPs) (that will be further developed and implementation started under this project) to ensure that the objectives of the SAP are closely aligned to national expectations. The four countries have demonstrated their commitment to co-operation, protecting the NSAS resources, and implementing the SAP through the formal endorsement of the SAP by the Ministers from all countries. The project, through the SAP implementation will help the countries address levels of poverty and food security by improving knowledge and understanding of the NSAS water resources across all levels of society. The project is in-line with SDGs, PRSPs and NAPAs. In Chad and Sudan, the NAPAs are clearly directed towards agriculture/food resources, water management and land resources. Throughout much of the countries, water resources are limited, soil fertility is low, and drought is common. These underlying conditions are exacerbated by range of human pressures, creating a situation in which the region is highly vulnerable to current climatic shocks - and apart from taking adaptive measures - will become even more vulnerable in the face of future climate change.

The project will contribute to the integrated management of water resources at all levels including through cross-border cooperation. For example, the project is aligned with the strategic axes of the National Development Plan horizon (2017-2021) relating to the management of water resources and the environment in Chad. The project will provide a practical opportunity to achieve SDG Goal 6 and

will contribute towards SDGs relating to reducing hunger, poverty, gender and life on land. This will further encourage national government orientation in policy, planning, and budget allocations to comprehensive perspective for different dimensions of hunger and poverty by involvement and consultation of all stakeholders.

Through National Action Plans (NAPs), the SAP will provide additional pressure to enhance capacity of government staff at central and local levels and to encourage education institutions to mainstream water and ecosystem management in to syllabuses, further sustaining the work of the project to assist in addressing poverty, food security and ecosystem preservation.

Through an acknowledged recognition by all countries to improve the involvement of women and girls in water management and ensure that the products of the project will enhance all parts of society, the project will further the cause of equality between women and men.

2.3 Proposed alternative

The project will address key targets identified in the agreed SAP on reforming /updating legal, policy and institutional arrangements, strengthening capacity and implementing collective measures within the four countries and at the regional level to protect the resources of the NSAS and associated ecosystems. Through strengthening national institutions and the regional Joint Authority, this project will result in assisting with sustaining the effective operations of the Joint Authority to co-ordinate the management of the NSAS.

The project will be undertaken through four inter-linked components and supported by a regional project management unit (PMU) planned to be co-located within the offices of the Joint Authority.

- **Component 1** will further improve the technical understanding of the NSAS and associated ecosystems to provide a common basis for the future joint management of the resource within the region;
- **Component 2** will address the SAP priorities to strengthen national and regional capacities on water resource and ecosystem management and assist in increasing awareness within the wider stakeholder groups (including the local population) on ecosystem management and protection.
- **Component 3** will further enhance the implementation of the SAP at the national level through strengthening policy and institutional reforms through National Action Plans;
- **Component 4** will implement a range of pilot demonstration activities (based on preliminary recommendations in the SAP) that will act to catalyse national and regional interest in up scaling and replication.
- **Component 5** will undertake pre-feasibility studies to aid future investment strategies and to identify appropriate donors to build on this catalytic project initiating the implementation of the SAP.

2.4 Design principles and strategic considerations

The countries of the Nubian recognise the increasing pressures on the NSAS and the threats these pose to the quantity and quality of the resource, which if not addressed, could lead to increased regional tension over availability to water. By initiating the SAP, the project will assist to reduce these threats whilst increasing the knowledge base on the NSAS and the capacity of national and regional institutions to manage the NSAS resource in a rational and equitable manner. Approaches will be highlighted to introduce measures (policies, technical, capacity development, etc.) to address the

increasing pressures taking into account potential climate change scenarios. The implementation of the SAP will also provide socio-economic and ecosystem benefits to support this region with limited options on renewable water resources.

The project will help the countries with the preservation of the fragile NSAS dependant ecosystem through a strengthening of the policies and stakeholders (including the local population) to protect the resource and assist with combating poverty while improving food security.

The project will help further strengthening the function and role of the Joint Authority to develop and implement effective management actions, in its capacity as both a clear beneficiary of the project and as a joint mechanism to oversee the regional management of the shared aquifer in support of the four Nubian countries. Regional collaboration for the management of the NSAS and implementation of the SAP relies heavily on the continued effectiveness of the Joint Authority. The previous mid-sized project supported by the GEF helped revitalize the Joint Authority and the project will aim at supporting these efforts. The SAP provided a framework for action at the transboundary level with active participation of the Joint Authority, of which the project will initiate implementation. These actions will be complemented by the development of corresponding National Action Plans (NAPs) in each of the Nubian countries. Specific policy, legal and institutional targets developed in the SAP to achieve the NSAS vision and meet the set Water Resources and Environmental Quality Objectives will be the focus of the project activities.

Meetings of the JA with the participation of the four Nubian countries are being held on a regular basis, and a technical meeting at the initiative of the Egyptian National Water Research Center (NWRC) and with the participation of Joint Authority board members from the four Nubian countries and PPG national expert consultants was held on 17-18 July 2017 in Cairo, Egypt. The objective of the meeting was to support the efforts towards the preparation of the project document. The meeting allowed national consultants to present to the Joint Authority the work they have been carrying out within the framework of the project document preparation and highlighted the significant role the Joint Authority will play during the implementation of the project. Recommendations of the meeting requested a timely preparation and submission of the project document in order to move forward towards a successful implementation of this relevant and important project. On 8-9 September 2017, the Joint Authority organized an exceptional meeting of the Board prior to the PPG Regional Validation Meeting (10-11 September, Khartoum, Sudan), and reaffirmed their support for the implementation of the project. The JA Board considered essential to strengthen the capacity of the JA in order to sustain the results that will be achieved during the project.

2.5 Incremental reasoning

Through the implementation of the endorsed SAP, GEF will support the strengthening of the capacities of countries, and in particular, reinforcing the capacity of the JA to assure its sustainability after the end of the project. The project will contribute to develop and implement new policies and procedures including regulatory/institutional reform, monitoring / hydrogeological mapping / modelling of aquifer and ecosystem assessments – resulting in new skills. The JA will serve as the principal coordination mechanism for the countries to apply shared and common approaches to the management of the aquifer. Through the GEF resources (and expected national and partner co-financing) the countries will provide due support to the JA. They will collaboratively implement pilot demonstration activities that will further enhance the knowledge and capacity of all involved

stakeholders to utilize the NSAS resources for multiple purposes including protecting the water dependent ecosystems.

During the implementation phase of the project, the close coordination with the Members of the JA will secure that the project's objectives will enhance regional co-operative governance. The project will develop recommendations on national legal, policy and institutional reforms. The project, through improving the technical understanding of the complex aquifer and its interactions with surface ecosystems, and through the shared undertaking of pilot demonstration projects, will result in improved sustainability of the resources, ecosystem and livelihoods of the NSAS population.

GEF resources are essential to initiate and further refine the SAP, and to support the strengthening of the regional Joint Authority tasked with co-ordinating actions of the NSAS after the project. The project implementation will set up a solid base to ensure the co-ordination of the necessary policy and operational changes that will have to be implemented.

The **alternative scenario** will clearly facilitate the implementation of the SAP that will help to address the shared problems that were identified in the SADA leading to improved ecosystem and water resource status, and strengthened livelihoods with improved engagement of all sections of society in the overall management of the NSAS.

3 RESULTS AND PARTNERSHIPS

3.1 Project outputs and activities

3.1.1 **Component 1:** *Collaborative actions to further validate the functioning of the NSAS and its resources*

Although the Nubian countries have made great advances in understanding the condition of the aquifer and the linkages between potential changes in the aquifer and responses of environmental and human systems, much work remains. The following gaps identified in the SAP will be considered through this component in order to strengthen the common understanding of the functioning of the NSAS:

- **Aquifer characteristics and groundwater regime:** Although there exists a fairly good general knowledge of the geology, including subsurface stratigraphy, there is still a lack of geologic and hydrologic data as vast expanses of the aquifer are essentially unknown. Improved knowledge is required to update previous findings from modelling and hydrogeological mapping activities.
- **Isotopic Age Dating:** Limited knowledge on the movement of groundwater in the NSAS was also a major constrain because the aquifer system contains very old waters from previous pluvial periods. The analysis of groundwater using isotopic age dating could confirm theories regarding water movement, recharge, mechanism, and the interaction relation between the multi layers in the aquifer and the neighbouring NSAS geographical sub basins.
- **Ecosystem Assessment and Vulnerability:** Only limited data appear to be available on the condition of terrestrial and oases ecosystems and there is a need to identify endemic species at risk and to develop a prioritized biodiversity inventory.
- **Climate Change Threat:** Adverse environmental changes are likely to occur in both grasslands and aquatic oasis ecosystems. A better understanding of the impacts of climate change is necessary in order to separate the effects of the natural trajectory of the desert ecosystems from the human-related impacts.

This component will deliver the following outcome:

- **Outcome 1.1: Strengthened common understanding of the functioning of the NSAS, taking account of potential climate change and variability threats, based on the agreed methodology and data as basis of regional and national land and water resources management decision making**

This outcome will be achieved from the results of four outputs:

Output 1.1: Reducing uncertainties to achieve a common understanding of the NSAS functioning from joint studies

Output 1.2: Joint Regional monitoring network implemented and operational by year 3

Output 1.3: Updated & NSAS operational hydrological model at national and regional level and updated hydrogeological maps and cross-sections

Output 1.4: Assessment of oases ecosystems and vulnerability (including climate change impacts)

✓ **Output 1.1: Reducing uncertainties to achieve a common understanding of the NSAS functioning from joint studies**

The project will undertake a comprehensive assessment of the Nubian Sandstone Aquifer System (NSAS) existing resource base, its current state and utilization based on available existing geological and hydrogeological data. A methodology harmonized across the national segments of the NSAS will be applied in the four project countries and will focus on the water resources of the Nubian System (NS) and the Post Nubian System (PNS). It will aim at providing an updated, systematic and homogeneous review of the NSAS conceptual model including the time dimension (seasonal, variations and observed/predicted long-term trends). The assessment will include two main activities (Activities 1.1.1 and 1.1.2) that will lead to the update/review of the NSAS conceptual model both at national and regional level (Output 1.3):

Activity 1.1.1: Aquifer inventory and characterization

Two major results are expected from this activity:

- Making the NSAS “visible” and recognized by countries, all stakeholders, and decision makers through new geological and hydrogeological maps on the basis of existing data/information (including previous isotope surveys and data). The existing geological and hydrogeological information will be harmonized in a compatible format to be easily used by modern software platforms. This will include updating the geologic structure and tectonics affecting the groundwater occurrence and the hydrogeological boundaries of the NSAS.
- Provide a description of the present hydrogeological, environmental, socioeconomic, and governance conditions of the NSAS and its interactions with ecosystems. In addition to the information derived from national and regional sources and experts networks, newly collected data from satellite image processing (e.g. Gravity Recovery and Climate Experiment – GRACE observations), and from modelling will be used in some cases to fill gaps in information coverage, complementing/extrapolating available information, producing projections and scenarios, and identifying parameters to be monitored over time.

Activity 1.1.2: Application of a multi-disciplinary indicator-based methodology

The main functions of indicators are: simplification, quantification, communication, ordering and allowing comparison of different countries and groundwater regions; providing condensed information on the functioning of the aquifer system and its response to stress in an understandable format; and acting as an important communication tool for policy and decision makers, planners and the public.

The project will carry out and identify a set of core indicators that will be used for the following purposes:

- Describe the state of the resource: regular measurement of indicators provides time-series that show trends and may thus provide information on the functioning of the system or its response to stress,
- Communication: another important function of indicators is communication,
- Assessment: an indicator value can also be compared to a reference condition and so can be used as a tool for assessment,
- Projections: when models are linked to indicators, time-series projections may be derived.

As a result of the application of the multi-disciplinary indicator-based methodology, the project will allow to: (i) provide a standardized, modern and harmonized characterization of the current state of groundwater resources, (ii) describe a set of quantity, quality, ecological functions, socio-economic factors and current uses, and (iii) assess the vulnerability of the aquifer system to pollution and climate change. The selection of the set of indicators will be a participatory process among the experts of the four countries based on the Transboundary Waters Assessment Programme (TWAP) methodology developed by GEF and UNESCO-IHP that has been applied and tested in the UNESCO-IHP Governance of Groundwater Resources in Transboundary Aquifers (GGRETA) project. This methodology builds on the ISARM (Internationally Shared Aquifer Resources Management) programme led by UNESCO International Hydrological Programme (IHP) and the International Association of Hydrogeologists (IAH) since 2001, which is aimed at improving the understanding related to the governance and management of shared aquifers through a multidisciplinary approach.

✓ **Output 1.2: Joint Regional monitoring network implemented and operational by year 3**

Monitoring equipment is available in the region. Nevertheless, systematic indicator based groundwater monitoring is absent in the region. The project will hence engage in the design of a modern multi-purpose groundwater monitoring network taking into consideration results of Outputs 1.1, 2.3, 2.4, 2.5, the socio-economic conditions of the countries and network sustainability issues.

Activity 1.2.1: Design of a regional monitoring network

- This activity will consist on the design of a modern regional monitoring network that will provide information on:
 - Groundwater trends (quality and quantity) in response to climatic fluctuations and water abstractions,
 - Aquifers and parts of aquifers subject to over-exploitation,
 - Water quality conditions and trends,
 - Health of water dependent ecosystems and humid areas,
 - Interactions with surface waters,
 - Incoming drought conditions.

The regional monitoring network will build upon a joint harmonized database containing information on borehole specifications (borehole yield, water level, water quality, stratigraphy, transmissivity, etc...) that will be developed/updated during the project (Activity 2.4.2). The harmonized database will then feed an Information Management System (IMS) that will enable country users to collect, store and share data and information based in a consistent way following monitoring protocols developed with the countries and the JA (Activity 2.4.3). Activities related to the IMS are provided in Component 2 (Outputs 2.4 and 2.5).

✓ **Output 1.3: Updated & NSAS hydrological model at national and regional level**

The project will update/review of the NSAS conceptual model both at national and regional level based on available existing geological and hydrogeological data (including previous isotope surveys and data).

Activity 1.3.1: Update/review of the NSAS conceptual model

The update/review of the NSAS conceptual model will build upon activities 1.1.1 and 1.1.2. The NSAS conceptual model will be represented:

- Two dimensionally on a map containing the boundaries of the aquifer system, recharge and discharge areas including dependent ecosystems,
- Three dimensionally in geological cross-sections of the subsurface, indicating the approximate geometry of the aquifer, its varying depth, its relations with aquitards and aquicludes, the major tectonic discontinuities and preferential pathways and barriers.

Activities 1.1.1, 1.1.2 and the review of the NSAS conceptual model will also allow scenario analysis with the development of a scenario model for the NSAS through the collaboration with the International Institute for Applied Systems Analysis (IIASA).

✓ **Output 1.4: Assessment of oases ecosystems and vulnerability (including climate change impacts)**

Only limited data appear to be available on the condition of terrestrial and oases ecosystems and there is a need to identify endemic species at risk and to develop a prioritized biodiversity inventory.

Activity 1.4.1: Assessment report on oases ecosystems and vulnerability

The report will provide a comprehensive assessment of the current state of terrestrial and oases ecosystems, as well as projections and scenarios by considering the evolution of demands in relation to agriculture and population dynamics among other economic developments. The assessment will also consider the inclusive participation of regional and local actors, and civil society.

The project includes countries requirements for equipment in order to support activities to further validate the functioning of the NSAS and its resources.

3.1.2 **Component 2:** *Strengthening capacity of national organisations and the Joint Authority, in-line with SAP, to manage the NSAS resources in a rational and equitable manner*

The SAP acknowledged ‘that the Nubian countries vary considerably in their capacities for field, laboratory monitoring, and groundwater modelling activities. The co-operative mechanisms developed through the Joint Authority need to be exploited to equalize capacity among the countries’. This component will focus on addressing these issues that will also assist with long-term sustainability by strengthening the capacities of the Joint Authority to undertake the day-to-day technical management of the NSAS.

The project will develop during its inception a knowledge management strategy which will address fundamental needs within the NSAS through the delivery of trainings (training workshops, formal training, ad hoc trainings such as webinars, exchange study tour with other transboundary water management institution) targeting a range of stakeholder (national technical and managerial staff, JA, NSAS users such as e.g. farmers, women’s groups, NGOs) and making use of existing and new databases and tools. All training activities will aim at achieving gender-balanced participation. The IW: LEARN Groundwater COP will be an appropriate platform to share lessons from the implementation of this project and learn from the other GEF and non-GEF groundwater projects. Results and lessons learnt from this component, together with lessons learnt from other components in particular component 4 (pilot demonstrations) will also contribute to component 5 and the development of a

NSAS investment programme for further SAP implementation. They will also be widely disseminated and contribute to the communication and outreach strategy of the project.

The project will organize training courses on “Water and Gender” in all Nubian Aquifer countries to strengthen local capacities in gender analysis, sex disaggregated data collection in order to enhance gender equality and women’s empowerment as part of SAP implementation. Training will be based on the Gender & Water Toolkit developed by WWAP that provides a conceptual framework and sex-disaggregated indicators for the monitoring of the SDGs, with particular reference to SDGs 5 (gender) and 6 (water and sanitation), and their interlinkages with all the other SDGs. This capacity development aims to help officers from the different countries to integrate sex-disaggregated water indicators¹⁰ into their National Strategies and, more importantly, make optimal use of gender statistics and related analysis for informed adaptation of related water policies and strategies. Moreover, sex-disaggregated water data availability will allow monitoring regional trends and progress towards the Agenda 2030 achievements. The gender training will target medium-high level officers and decision-makers, water practitioners, officers of water-related governmental institutions at national level and regional agencies, NGOs, academies, local women organizations, and other relevant stakeholders. The improved capacity of (water) professionals and policy-makers to disaggregate water data in terms of gender will contribute to the better understanding of the inter-connections between gender and water in the context of the social, economic and environmental dimensions. This will help performing gender-sensitive reporting on SDG 6, and make more visible women’s contribution to the field of water. At the end of the training course, the participants will be in the position to make informed gender-sensitive decisions in their daily work, and hence contribute to gender-transformative sustainable water resources management. The results of the training will become a patrimony that will strengthen the trainees’ abilities to provide improved statistics on gender and water to inform evidence-based and effective policies for women’s empowerment and gender equality in water resources management in their own countries. The regional network of individuals initiated by the course might continue to exist beyond the course and become a continuing source of opportunities for South-South experiences and exchange.

This component will deliver two outcomes:

- ***Outcome 2.1 Operationally strengthened National and Regional Authorities with sufficient technical and managerial capacities to jointly manage the NSAS towards its rational and equitable utilization that maximizes socioeconomic benefits while protecting critical ecosystems dependent upon NSAS.***
- ***Outcome 2.2 Trained stakeholders ensure environmentally and socially optimal development and protection of NSAS water and land resources and linked ecosystems***

These two outcomes will be achieved from the results of five outputs:

Output 2.1 Completion of training on model use and maintenance;

Output 2.2 Training and assistance to undertake updates to national/regional policies and institutions;

¹⁰WWAP identified 40 key indicators corresponding to 5 pertinent priority topics: water governance; safe drinking water, sanitation and hygiene; decision-making and knowledge production; transboundary waters resources management; and water for income generation for industrial and agricultural uses.

Output 2.3 Joint modelling centre within JA by year 2;

Output 2.4 Implementation of updated information management system within the JA/ countries by year 2;

Output 2.5 Data & Information Protocols related to transboundary reporting of NSAS.

Specific functions to be strengthened by this project to enhance the regional water management include:

- Improve the capacity and capability of the four countries and the JA on groundwater modelling, that would help develop a proposal for a Joint Modelling Centre within the JA;
- Assist the countries with isotope studies and their interpretation to provide enhanced data for the agreed conceptual model and improve their analytical services at the region (recent isotope lab);
- Provide both national and regional authorities with appropriate management information through an updated of the existing joint database and information system NARIS;
- Strengthen the national and regional capacity to review and revise legal and institutional arrangements that will enhance the shared management of the NSAS and assist with planned updating of the JA agreement including governance and remit (linked with Component 3);
- Sstrengthen the national and regional capacities in gender analysis and sex disaggregated data collection in order to enhance gender equality and women’s empowerment as part of SAP implementation;
- Undertake training and support to undertake regional joint studies to address the NSAS knowledge gaps identified in the SAP (linked with Component 1);
- Assisting the Joint Authority with the identification of sustainable financing mechanisms for managing and operating a central modelling facility;
- Develop training courses (linked with national academic institutes) to support capacity in undertaking environmental assessments of oases and to agree regional procedures for vulnerability assessments of oases;
- Initiate and maintain technical and management exchanges with key international groundwater centres of excellence and water management commissions/authorities;
- Develop national and regional skills to communicate NSAS activities and issues to stakeholders.
- Develop national competencies in the drafting of legal texts related to water.

Purchase and preparation of training materials for the execution of the activities of this component including: water analyses (to be undertaken through contractual services with national and regional institutions), software and field /laboratories consumables, are identified in the budget.

These actions will be strengthened through Outputs 2.1 – 2.5 and the activities listed within these outputs. All training and capacity development activities will have gender issues mainstreamed into their programmes to promote engagement of women and men equally in water management.

The project will work closely with GEF IW:LEARN and related regional initiatives (e.g. through MENARID programme) to further disseminate experiences, good practices and results. One per cent of the GEF budget will be devoted to supporting IW:LEARN activities (including GEF IW Conferences, Experience Notes, Exchanges, participation in Communities of Practice, etc.).

Detailed communication and stakeholder engagement plans, capitalising on the training programmes to be given, will be developed during the inception phase and presented to the first PSC meeting for

approval. These plans will utilise the experiences and examples available within the GEF IW community and accessible through the GEF IW:LEARN Project Managers Guidance Manual.

✓ **Output 2.1 Completion of training on model use and maintenance**

Activity 2.1.1: Assessment of needs and priorities with countries and JA

Activity 2.1.2: Preparation of training material

Activity 2.1.3: Joint regional trainings organized on model use and maintenance

✓ **Output 2.2 Training and assistance to undertake updates to national/regional policies and institutions**

Activity 2.2.1: Stakeholder analysis and diagnostic carried at national and regional level (including sex-disaggregated data collection and assessment) and outreach strategy developed for project and investment programme to engage all stakeholder groups including private sector

Activity 2.2.2: Preparation of training material and modules for trainers, decision-makers, NGOs, water users (farmers, women's groups), etc.

Activity 2.2.3: Joint regional training modules carried out on 1) groundwater resources governance (making use of findings/recommendations/lessons learnt from previous GEF funded project "Groundwater governance: a global framework for action"), 2) legal, institutional, policy aspects of groundwater resources management at national and JA level, 3) water diplomacy, negotiation and drafting techniques, 4) gender mainstreaming, 5) stakeholder engagement and public participation, 6) new isotope dating techniques, 7) model use and maintenance, 8) JA trained on office running (e.g. staffing plans, internal policies, financial mgmt., M&E).

Activity 2.2.4: Gender training events: Prepare and deliver training programs tailored to the specificities of each one of the four countries and of their groundwater resources. Preparing and disseminating material (French and English). Organising national face-to-face training events (two trainings for each country duration of one week) complemented by online activities and webinars.

Activity 2.2.5: Dissemination of material and training outcomes

✓ **Output 2.3 Establishment of a joint modelling centre within JA**

Activity 2.3.1: Assessment of needs

Activity 2.3.2: Prefeasibility study of joint modelling activities within the framework of the JA

Activity 2.3.3: Development of proposal to be communicated to JA on development of joint modelling activities

✓ **Output 2.4 Implementation of updated information management system NARIS within the JA/ countries**

Activity 2.4.1: Assessment of local/regional needs (database, capacity-building)

Activity 2.4.2: Develop/update of joint harmonized database

Activity 2.4.3: Information management system populated

✓ **Output 2.5 Data & Information Protocols related to transboundary reporting of NSAS**

Activity 2.5.1: Drafting of Data & Information protocols

Activity 2.5.2: Facilitate discussion with JA and countries on development and adoption of Data & Information protocols.

This output will build on previous JA Agreements on data and information sharing (2000).

*3.1.3 **Component 3:** Enabling SAP implementation through legal, policy and institutional reforms at both national and regional levels*

The effective implementation of the agreed SAP requires the countries of the NSAS to develop corresponding National Action Plans (NAPs) - specific to each country – aligned with national development plans/policies and where necessary to transform policies and institutions to deliver the expectations of the SAP. In addition, the SAP stresses the importance of strengthening the legal and institutional framework at the regional level through the Joint Authority. This component will address both the needs of national governments to develop and to initiate the implementation of NAPs and to formally review and, if needed, enhance the legal status and remit of the JA.

National teams will engage stakeholders to develop NAPs that address each country's specific needs and common elements to all countries. A series of national and regional workshops will be required to review national policies and institutions and develop appropriate changes where needed. The reviews will cover: national monitoring and sharing of data; legal and institutional mechanisms to protect groundwater from over exploitation and consideration of ecosystem dependency on groundwater (taking into consideration potential impacts from climate change, economic development, population increases and migration, etc.); development of common (between the four countries) policies and procedures for managing the NSAS, including approaches for ensuring common adopted management actions are 'climate proofed'. This work will result in NAPs that are in-line with the agreed SAP for government approval and support.

The NAPs will present a road map for the implementation of key legal and institutional reforms, at the national level, identified within the SAP, and ensure the regional compatibility of the approaches between each country. The NAPs will also include the means and mechanisms for outreach/awareness raising targeted at various stakeholder groups to reinforce the importance of the protection and equitable use of the aquifer and the need for effective management of groundwater and surface waters. Following the development of the NAPs, implementation of the SAP recommended reforms will be undertaken in each country addressing the key targets, specifically:

- Target 1a.1: Establish enhanced transnational mechanisms to strengthen the existing cooperation through the Joint Authority and explore new areas of cooperation.
- Target 1a.2: Establish a cooperation framework on data exchange
- Target 1a.3: Ensure the effective establishment and performance of National Offices of the Joint Authority
- Target 1b.1: Enhance legal and institutional mechanisms to exercise regional protection and control on water use activities and priorities

- Target 1c.1: Establish legal and institutional mechanisms to enable adaptation to climate change
- Target 2a.1: Establish a regional legal and institutional mechanism to protect the NSAS dependent ecosystems and biodiversity, and extend the competence of the Joint Authority in this field
- Target 3a.1: Establish legal and institutional procedures to develop transboundary cooperation and integration of the NSAS dependent socio-economic activities and schemes of land use; considering efficient utilization of the waters
- Target 3b.1: Develop a strategy to establish cooperation on control and management of human migrations in the Nubian region

This component will deliver one outcome:

- **Outcome 3.1: Improved regional and national legal, policy and institutional frameworks for the integrated management of joint NSAS resources**

This outcome will be achieved from the results of three outputs:

- **Output 3.1:** Four NAPs developed and submitted for approval to National Authorities. The NAPs will pay special attention to, and include, proposals for updated national and regional legislation/policies and proposals for institutional reforms to reflect agreed SAP priorities and agreements by year 3 as indicated above in the examples of specific SAP targets
- **Output 3.2:** Joint Authority operational with strengthened role/capacity and with regular and sustainable national financial contributions by year 4
- **Output 3.3:** Gender-sensitive review of existing institutional settings and policies at national level in the four countries, and at regional level (JA)

These three outputs will allow the development of a full governance baseline assessment and institutional analysis at national and regional level for the NSAS, including recommendations for change and a roadmap to address recommended changes in the governance environment, at national and regional level.

✓ **Output 3.1: Four NAPs developed and submitted for approval to National Authorities**

The NAPs are the key instrument to deliver the goals agreed by the countries through the SAP. As an improved governance structure, in each country and regionally, for groundwater stocked in the NSAS, and for the aquifer, is at the heart of the SAP and the project, the NAPs will play a pivotal role in the economy of the project as a whole. Priority attention in the NAPs will be given to the policy, legal and institutional environment and reforms called for by the SAP, at the domestic and at the regional level.

Activity 3.1.1 – Review of the domestic policy environment in the four countries, assessment of same for consistency with the goals and requirements of NSAS, and formulation of proposals for a reformed policy environment. The points of departure for this activity will be:

- In Chad, the National Water and Sanitation Master Plan
- In Egypt, the Groundwater National Plan, updated from the latest (2012) edition
- In Libya, the National Water Strategy (2000 – 2025)
- In Sudan, the available relevant policy documents/statements, including the National Action Plan targeted at poverty reduction

Activity 3.1.2: Review **and recommendations for the updating** of the domestic regulatory environment for groundwater and for related matters in the four countries, assessment of same for consistency with the requirements of NSAS management, and formulation of proposed regulatory reforms – In particular:

- in Chad, this activity will focus on implementing Regulations required to roll out the Water Code and the Environment Code, both in effect
- in Egypt, this activity will focus on the review and adjustment of the water resources abstraction & use legislation for the proper implementation of the groundwater policy reflected in the Groundwater National Plan. The activity will be aligned with the new Water Resources Law in preparation
- in Libya, a review of the existing legislation will be conducted with a special attention to the introduction of appropriate clauses on water abstraction, water use and protection to deal with new projects (especially agricultural) that require substantial abstraction for prolonged periods of time and/or have potential for water quality deterioration
- in Sudan, the activity will focus on the assessment of the Nile Pumps Control Regulations 1951, Irrigation and Drainage Act 1990 and Water Resources Act of 1995, and three new regulations approved in 2016: Regulation for Groundwater control, Regulation for Irrigation and Drainage, Regulation for surface water control. The activity will be informed by the emerging concerns for environmental change and its effect on the ecosystem as to desertification and water scarcity, and by the attendant concern for the conflict potential between nomadic pastoralists and farmers regarding the fair distribution of the few available natural resources

Activity 3.1.3: Review **and recommendations for the updating** of government-level structure & capacity to administer & enforce regulations, and formulation of proposals for a strengthened government groundwater administration in the four countries. In particular, this activity will target:

- In Chad, the Ministry of Water & Sanitation – formerly Ministry of Rural Hydraulics, re-named in 2014 Ministry of Livestock and Hydraulics, Ministry of Irrigation, Production and Agricultural Equipment
- In Egypt, the Ministry of Water Resources and Irrigation, NWRC, RIGW, and the interministerial Supreme Committee for Groundwater Licensing
- In Libya, the General Water Authority
- In Sudan, the Ministry of Water Resources Irrigation and Electricity

and it will include and size up:

- the role and capabilities of other government Ministries and Authorities in relation to groundwater in general, and to the NSAS in particular, and
- arrangements for co-ordination/avoidance of conflict/overlap with the lead Ministries above-mentioned, as regards groundwater in general, and the NSAS in particular

Activity 3.1.4: Drafting of the NAPs

- Four NAPs – one for each NSAS country – will be drafted, incorporating the result of activities 3.1.1, 3.1.2 and 3.1.3

Activity 3.1.5: NAPs and proposed reforms **presented to** key stakeholders, in the appropriate fora - domestically in each of the four countries, and regionally - with a view to achieving broad-based acceptance of the proposed reforms. Key stakeholders include:

- the government Ministries and Authorities responsible for groundwater in general, indicated in Activity 3.1.3 above
- other groundwater-relevant Ministries and Authorities, also canvassed in Activity 3.1.3 above
- the private groundwater-dependent sector
- traditional groundwater users in general, and
- civil society, particularly as regards the representation of environmental and gender interests

Activity 3.1.6: NAPs **developed** and formal submission to National Authorities **for implementation**

Following intense consensus-building campaign under Activity 3.1.5, the four NAPs will be finalized and submitted to the National Authorities for their endorsement and formal approval.

✓ **Output 3.2: Joint Authority operational with strengthened role and capacity**

The Joint Authority is key to present and future enhanced cooperation among the four countries sharing the NSAS. Its key role is acknowledged by the four countries in the SAP, and a strengthened JA is a central feature of the NAPs called for by the SAP. A strengthened JA is also the key to delivering on the expanded scope of interstate engagement regarding the NSAS, foreshadowed in the SAP. For this reason, the JA is the target of a dedicated project Output.

Activity 3.2.1: Review and assessment of existing regional agreements for the NSAS, and formulation of proposals for reform regarding (a) procedural rules of interstate engagement, and (b) substantive rules of interstate engagement

Activity 3.2.2: Review of the structure, remit, *modus operandi*, and funding arrangements of the JA, and assessment against the objectives and commitments of the four countries in the SAP

Activity 3.2.3: Formulation of proposals for desirable and achievable reforms in the structure, remit, *modus operandi*, and funding arrangements of the JA

Activity 3.2.4: Discussion of proposed reforms with key stakeholders, in the appropriate fora - domestically in each of the four countries, and regionally - with a view to achieving broad-based acceptance of the proposed reforms. Key stakeholders include:

- the JA
- the government Ministries and Authorities responsible for groundwater in general, and for the national segments of the NSAS in particular, indicated in Output 3.1 above
- the government Ministries in charge of foreign affairs/relations
- other groundwater-relevant Ministries and Authorities canvassed in Output 3.1 above
- the private NSAS groundwater-dependent sector
- traditional groundwater users from the NSAS region, and
- civil society particularly as regards the representation of environmental and gender interests in the NSAS region

Activity 3.2.5: Crystallization of accepted reforms in a binding regional instrument, and submission to the National Authorities of the four countries for endorsement, and signature eventually

Activity 3.2.6: Support to the roll-out of agreed reforms through the development of national road-maps to assist countries with the key steps needed to strengthen the JA

✓ **Output 3.3 Gender-sensitive review of existing institutional settings and policies at national level in the four countries, and at regional level (JA)**

This output will consist in analysis of compliance with international laws and treaties concerning gender and women empowerment, and gender analysis of national water policies and institutions. The purpose is making note of the regional and national legal/policy trends regarding gender and groundwater, as well as the key challenges and opportunities presented by the legal framework and institutional structure, and identify needed legal, institutional and policy reforms that could be gender transformative.

Activities will include:

Activity 3.3.1: Review of the extent to which the four countries sharing the Nubian Aquifer have ratified and complied with the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and other relevant international legal instruments, such as the Protocol to the African Charter for Human and People’s Rights on the Rights of Women in Africa, the 1995 Beijing Declaration and Platform for Action (from the Fourth World Conference on Women) and the Sustainable Development Goals (SDG).

Activity 3.3.2: Analysis of country water policies from a gender perspective.

Activity 3.3.3: Gender analysis of the agreement establishing the Joint Authority.

Achievement of these planned targets through the management actions agreed in the SAP will result in improvements of the operation of the JA to regionally co-ordinate the ecosystem and water resources protection strategies across the NSAS.

*3.1.4 **Component 4-** Targeted Pilot Projects to validate environmentally and socio-economically rational and equitable management approaches within the NSAS*

Pilot demonstration projects are integral to validating the approaches for resources and ecosystem management within the NSAS. The pilots will assist with the development of the NAPs and encourage additional national resources to be provided, that will aid sustainability of the SAP actions and facilitate replication /up scaling of the pilots both nationally and regionally.

The pilot projects needs for specific groundwater monitoring equipment is recognised as essential by the countries and the JA. Component 4 includes GEF resources for these items to enable all four countries to have an ability to measure and quantify the impacts of the pilots’ actions on the NSAS at the selected pilot sites. During the inception phase, specific requirements for equipment will be considered. UNESCO will contribute helping in mobilizing co-financing funds during the duration of the project.

As required by UN procurement rules equipment will be subjected to a national needs assessment and international procurement procedures. During the inception phase a detailed country needs

assessment will be undertaken to confirm the specific monitoring equipment required by the pilot projects. The approval of the selected pilots/locations (to be presented to the first PSC/inception meeting) will also confirm the final equipment to be provided to each pilot within the budget provision. Equipment will be procured through an international tendering process launched by the project.

The focus of these pilot demonstrations will be addressing elements that are either of common problem (i.e. shared) or can be used in specific transboundary locations that will further encourage international co-operation. The SAP identified two themes that should be explored by the pilot actions as:

- **Water Conservation:** The SAP identified a range of actions that would be beneficial to protecting the NSAS resources through reducing demand and pollution to encourage reuse of wastewaters. These will address water conservation in different sectors (agriculture – including irrigation methods, the use of alternative crops, reducing impacts from agro-chemicals, industry – including oil polluted waters, wastewater, etc.) and highlight the benefits of integrated land-water management. Where appropriate, links and experience exchange will be made with relevant MENARID projects within the North African / mid-East regions. (For example this Project will could link with FAO’s experience and related activities and pilots in the field, as well as MENARID theme of groundwater’s role in land management and agricultural production including aquifer recharge management – water harvesting, and the enhancement of traditional knowledge in MENA countries, in order to promote integrated land and groundwater management practices and solutions aimed at increasing the effectiveness of soil conservation efforts and more generally of land degradation mitigation initiatives and link with progress made with GEF IW:LEARN collaboration on these issues within the MENA countries).
- **Ecosystem Conservation:** To-date there has been little assessment of ecosystems that are dependent on the NSAS water, specifically at oases. The SAP identified the need to implement a range of demonstration activities at national locations (with common features to aid replication) and/or at transboundary sites, (for example the establishment of a cross-border protected area between Chad and Sudan). These pilot activities will be important for both national and regional authorities to gain experiences from and for local communities who are dependent on the ecosystem services provided by oases, to better appreciate the value and the vulnerability of these important groundwater dependent resources.

Tentative pilot projects were identified during the development formulation of the SADA and SAP and presented in the PIF. During the PPG phase, national experts used a range of criteria to rank these tentative project ideas, plus additional projects that have been considered, to identify a preferred national pilot project. About 20 criteria (template included in Annex H) were used to help prioritise over 15 projects including:

- Relevance to the SAP Environmental Quality Objectives;
- Relevance and interest to the JA and to local and national authorities with sustainability likelihood;
- Interest to multiple countries, to ensure lessons had greatest opportunities for replication;

- Pilots that offered significant training opportunities and had the highest possible engagement of local/national stakeholders; and,
- Practical/logistical aspects: pilots that would be readily accessible (i.e. would not involve excessive travel), security issues, completed within agreed timescale and budget, etc.

Following the prioritisation of potential pilots, national experts developed detailed proposals on the preferred national pilot projects.

A summary of the four pilot projects (to be reconfirmed at the Inception Meeting/first PSC meeting) suggested are:

Chad: Environmental protection of Guelta Archei and Bachikelé (Protection environnementale du Guelta Archei et Bachikelé)

These important water sources are the primary and secondary sandstones that extend over the Chadian territory from Borkou to the northeast of the Ennedi. The Project area takes into account the border regions with Libya, mainly the regions of the East and West Ennedi. The potential for water resources is enormous, but there is limited exploitation. The local population travels significant distances for their water needs and the watering of cattle. In the southern part of the zone, the aquifer outcrops on the gueltas as Archei and Bachikélé and the lakes towards Ouanganga kebir and Serir.

This project aims to improve access to drinking water in the south of the NNSAS area in order to improve the living conditions of the population and livestock, by reducing the effort of water collection and limiting the associated risks to those collecting water (predominately women). The project will also help to stabilise livestock keepers to limit the potential conflicts between farmers. Pollution of sources will be reduced through awareness raising and source-protection management actions.

Key outcomes expected by this pilot:

- Populations south of the Nubian sandstone zone have access to drinking water;
- Reduction of local population and farmers' livestock conflicts from access to water supplies;
- Improving the management of the water sources by the beneficiary communities.

Egypt: Environmental impacts of climate change on the "Siwa and East Qattara Depression", post-Nubian aquifer systems and NSAS interactions.

The pilot project is aimed at the improving the management of the groundwater resources In the Egyptian oases and conservation of the environment. The Siwa, South East Qattara and Baharyaa oases are the most prominent features of the North Western Desert of Egypt. They are green patches amidst the surrounding sterile desert, attracting the European migratory birds in winter.

This Pilot Project will motivate the application of qualitative and quantitative groundwater modelling approach with isotope hydrology techniques and environmental assessments. The pilot project will raise water use efficiency by: (i) promoting conjunctive use of post-NSAS water, agricultural drainage water, treated sewage water and NSAS groundwater; (ii) controlling unplanned use and depletion of groundwater; and (iii) promoting water recycling.

The pilot project will Increase water use effectiveness by: (i) establishing planning capacity, including appropriate planning approaches and tools; (ii) public and stakeholder participation in all steps of water management, including policy, planning, design, and implementation; (iii) establishing drought

management plans, with implementation mechanisms; (iv) reviewing and adjusting water use legislation and regulations for proper implementation of the water policy; and (v) engaging and mobilizing women and building public awareness about water management in the oases by better communications particularly in rural areas.

Expected key outputs include:

- Guidelines for the New Irrigation tools in Desert areas to reduce the water losses and reduce the Irrigation water consumption
- Guidelines for using the Brackish groundwater and saline in Agriculture
- Training courses in the field of Irrigation improvement and Integration and Efficient use , Water Demand Management
- Formulation of the water use associations and the Water Boards at production well level and the Production Well Field.
- Establish pilot farm in Siwa and in N.E. Qattara
- Establish good access to clean healthy drinking water in the villages

Libya: Environmental impacts of NSAS Development on Existing Oases

In Libya, the Nubian reservoir is largely exploited for two types of uses: domestic and agricultural, although the exploitation of the NSAS is small compared to the uses of the neighbouring countries. Users have a limited impact on the NSAS and the environment but the need for in-depth study is considered very crucial.

This project will be of great importance as the NSAS in the Libyan oases is exploited without any proper consideration to the environmental impacts. In addition, the oases targeted by the project have not been sufficiently assessed by a national or international institution with regard to environmental characteristics and components. In addition, the socioeconomic conditions have not taken into account by investors and beneficiaries of the NSAS; public awareness and capacity development were not considered.

The Libyan historic oases of Awjilah, Jalu, Jakharrah, Tazirbu, and Al Kufrah are urban areas growing with time. These oases are located over the NSAS aquifer, where water is exploited for drinking and agriculture with wastewater directly discharged to the ground. The abstraction is not always metered, and monitoring for water quality is poorly carried out. The shallow aquifer is therefore affected and needs to be assessed. The project will help in addressing these issues by raising awareness and building capacity of the local population.

Key outcomes expected by this pilot include:

- Improved understanding of hydrogeology and through spatial studies, improved maps;
- Improved understanding of the ecosystem importance of the NSAS;
- Increased information on socio-economic conditions;
- Improved local awareness and capacity of the population to effectively manage the NSAS resource.

Sudan: Development of the Salima Oasis

Salima oasis is located in the north-western part of Dongola Province at about 308 km North West of Dongola capital of Northern State. There are huge arable lands along the upper terrace, Ga'ab

depression, and along the old drainage systems between the Nile and Salima Oasis along the camel route to Egypt. The estimated arable land within the oasis is about 300 feddans (126 hectares) while the estimated potential east of Salima is 1,300,000 feddans (546,000 hectares). Extensive irrigable land is also found west of Salima.

The pilot falls within the broad strategic developmental goals of the country of tapping the national resources potentialities for achieving comprehensive development and food security. At a lower level, the States as autonomous governments have the powers to initiate development ventures in their own regions. The State government has already established the international market for camels at Dongola and is planning to create green oases along the camel routes to Egypt and Libya for production of fodder, water and veterinary services to encourage off-take and reduce camel mortality rates en route. The State government is also planning to use the NSAS water and soil resources in facilitating trekking and export to Egypt through the development of drinking water supply centres, expansion of irrigated fodder production (oasis development) and upgrading of the existing infrastructure of services.

The project aims at utilizing the NSAS groundwater to irrigate about 100 feddans (42 hectares) of arable land in Salima oasis area. Emphasis is laid on the growth of fodder such as alpha-alpha and abu-sabien (sorghum for fodder); however, both summer and winter crops can be grown. Such crops include: wheat, lentils, broad beans, spices, fruits and vegetables. Water conservation approaches will be considered in deciding which crops are to be grown and what irrigation method is most appropriate. The camel and cattle trades are the main targets for fodder production while the other crops can also be marketed for farm operation in the future. A multi-disciplinary approach is to be adopted for the pilot farm management including the local community.

Key outcomes expected by this pilot include:

- Experiences to illustrate potential adaptation approaches within the NSAS and provide proof of concept for up-scaling or replication elsewhere
- Preservation of Salima Oasis taking into consideration fauna and flora
- Socioeconomic development
- Animal resource development

The expected outputs of Component 4 include:

- **Output 4.1:** Completion of four pilot demonstrations that provide proof of concept for up-scaling/replication under the planned SAP activities.
- **Output 4.2:** Strategies developed and incorporated in national plans for replication and financial/institutional sustainability of pilot demonstration activities at additional locations

✓ **Output 4.1: Completion of four pilot demonstrations that provide proof of concept for up-scaling/replication under the planned SAP activities.**

Four pilot demonstrations will be carried out within the duration of the project. Each pilot is expected to last around 30 months. The final identification and selection of the four pilot demonstration activities will be reconfirmed during the inception phase of the project and endorsed by the first PSC meeting. The project will consult with the stakeholders to ensure national/local acceptance of the

proposed pilot projects to generate additional local co-financing to support both the pilot activities and to sustain these post-project. The lessons from the four demonstration actions will be widely disseminated to stakeholders across the region (in particular to decision makers, farmers, nomadic herdsman) to further encourage uptake of the concepts tested.

As an initial step, the four proposed pilot projects will be reassessed and if necessary redesigned to ensure complementarity and maximum regional benefits between the four countries. In addition, the final pilot project selection will dictate the equipment needed to ensure the satisfactory implementation and long-term monitoring of the pilots. All equipment identified for procurement will also be required to be confirmed through a detailed national needs assessment. **The pilots (location and activities) and the equipment to be procured will be discussed during the project inception. The identification of stakeholders involved will contribute to the alignment and strengthening of the execution of the pilots with country specific implementation structures and engagement models. This will be reported in the annual Project Implementation Report (PIR) and evaluated specifically in the Mid-Term Review (MTR).**

Activity 4.1.1: reassessment and final validation of pilot demonstrations and confirmation of the equipment needs. Initiation of the pilots and procurement will proceed following approval by the PSC.

Activity 4.1.2: four pilot demonstrations implemented

Activity 4.1.3: PMU assessment of progress and performance at mid-term to allow for any adaptive management changes to be implemented

Activity 4.1.4: results and lessons learnt of pilot demonstrations implemented developed and disseminated

✓ **Output 4.2: Strategies developed and incorporated in national plans for replication and financial/institutional sustainability of pilot demonstration activities at additional locations**

All the demonstration pilot activities will be closely linked with Component 2 – Capacity Development – to use practical experience to further strengthen the national and regional skills necessary for the future sustainable management of the NSAS. Integral to each demonstration project will be the development of a national and regional plan to support sustainability and to assist with identifying additional sites (and financial resources) for replication.

Activity 4.2.1: replication strategy and sustainability plan of pilot demonstration developed

Activity 4.2.2: potential sites for replication within NSAS region identified

Activity 4.2.3: potential donors and local/national/regional/international partners identified for replication of pilots in region

3.1.5 Component 5 - Prefeasibility studies to identify NSAS investment opportunities

Recognising the significant investments that are required to fully implement the SAP, this project will undertake a pre-feasibility assessment to review these needs and to recommend specific investments and approaches to protect the NSAS, improve livelihoods and better understand the approaches required to further support the SAP implementation. Pre-feasibility studies will better articulate investment options to progress the SAP implementation and guide the regional JA, national authorities

and international donor partners on future investments. As an agreed priority, confirmed by the PPG phase validation meeting (Khartoum, 10-11 September 2017) the initial focus will be on equipment needs to support further implementation of the SAP and address knowledge gaps on the NSAS.

The component links closely the lessons and experiences gained from all components and especially with the feedback from the pilots (Component 4). This component will link with Component 2 (capacity building activities) to further strengthen national/regional skills on the identification, scoping and engaging the donor community to further implement and sustain the SAP. The component will engage with national and international stakeholders to assist with the prioritisation of the SAP actions for investment, including civil society and the private sector. The long-term benefits of this component will support the countries achieve the SDGs, in particular SDGs 1 (poverty), 2 (hunger), 5 (gender), 6 (water and sanitation), 8 (decent work), 13 (climate change) and 15 (sustainable terrestrial ecosystems).

The project will review the list of potential investments addressing recommendations in the SAP for stress reduction and livelihood strengthening activities (including the contribution of the actions to the achievement of gender equality and women's empowerment) as well as benefit sharing opportunities for countries. Potential investments will be further developed with pre-feasibility assessments, budgets and outline descriptions for further action during the project's implementation along with the identification of potential donors that will be fully involved in the pre-feasibility studies. To further facilitate the implementation of the SAP, a donor conference will be organized towards the end of this project.

During the project inception phase, benefits will be explored of linking the actions of this project to develop potential bankable projects will be made with national actions undertaken by the GEF SGP.

This component will deliver one **outcome**:

- ***Outcome 5.1: Assessment of stress reduction and livelihood strengthening activities identified in the SAP leads to a broad investment programme to further catalyse SAP implementation***

This outcome will be achieved from the results of three outputs:

Output 5.1: Reassessment of potential investments based on the SAP recommendations;

Output 5.2: Pre-feasibility reports on potential investments with outline budgets, scope of work and timescales;

Output 5.3: Report from a donor conference (year 4) in partnership with the Joint Authority summarizing the key actions that require further investment, the benefits and lessons from the pilot demonstrations, sustainability plans and a road map for further SAP implementation.

- ✓ **Output 5.1: Reassessment of potential investments based on the SAP recommendations.**

The project will work with the JA and the national authorities to reassess investments required by the SAP recommendations to achieve the expected Environmental Quality Objectives for the NSAS. Where necessary, this will be based on any adjustments made to the SADA/SAP through Component 1.

Activity 5.1.1: JA and national reassessments of SAP investments and regional and national prioritisation of investments. This will include the initial urgent needs of equipment that will support

the JA in the long-term implementation of the SAP but will also be a benefit to activities during the project implementation;

Activity 5.1.2: Regional meetings to finalise potential investments (including laboratory / field monitoring equipment and modelling) for pre-feasibility studies involving national, regional and international (including potential donors) stakeholders (including civil society and the private sector). Criteria for prioritisation will be prepared to guide the final selection, including the preliminary lessons and results from Component 4 (pilot actions)

Activity 5.1.3: Exploring linkages with the GEF Small Grants Programme's actions in the region

✓ **Output 5.2: Pre-feasibility reports on potential investments with outline budgets, scope of work and timescales**

Based on agreed priorities for delivering the SAP agreed in Output 5.1, national and regional prefeasibility studies will be initiated. The studies, leading to reports on potential investments, will involve national stakeholders and international donors to guide the studies. The studies and final reports will describe the benefits of the investment, timeline for implementation, potential donors and other actors, sustainability and up-scale opportunities (both within the NSAS and more widely).

Activity 5.2.1: Undertake the targeted studies that will deliver a clear understanding of the benefits of co-operation and joint investments to deliver programmes that will achieve the SAP recommendations. The programmes are likely to address projects to improve and protect the NSAS dependent ecosystems and enhance socio-economic conditions for women and men. Full involvement of the national and regional authorities are essential in these studies to ensure both ownership of the future planned investments and to assist with long-term sustainability.

Activity 5.2.2: Publication of the pre-feasibility reports to guide a planned donor conference in year 4.

✓ **Output 5.3: Donor Conference**

In the last year of the project a donor's conference will be organised to both promote the work undertaken by this project and further engage with the donor community to promote the results of the prefeasibility studies and the expected 'bankable projects'. The meeting will be co-organised with the JA/national authorities and the project and will summarise the key actions that require future investments, the benefits and lessons from the pilot demonstrations, sustainability plans and a road map for further SAP implementation.

Activity 5.3.1: Planning and holding donor conference

Activity 5.3.2: Report on the donor conference with agreed road map on further SAP implementation actions

3.2 Partnerships

At the national level, the project will work closely with key stakeholders/partners from government authorities and institutions through the co-financing provided by the four countries. Within this national support for the project will be the significant role of the Joint Authority, both as a clear beneficiary of the project's work and as a basin authority to oversee the regional implementation of

the SAP in the long term. Partnerships will be sought with the private sector stakeholders (indicated in section 4 to assist with the SAP implementation and through co-operation with national NGOs and CSOs further partnerships will be forged to sustain the project's support to initiating the SAP.

This project will also coordinate with all related GEF and non-GEF projects dealing with shared aquifers in the region to share experience and avoid duplication of efforts. A group of closely related projects are those implemented by OSS, namely the North-Western Sahara Aquifer System (NWSAS) shared by Algeria, Libya and Tunisia, and the Lullemeden Aquifer System shared by Mali, Niger and Nigeria. OSS is active in the management of transboundary water resources and the implementation of multilateral environmental agreements addressing desertification, biodiversity and climate change. The Lake Chad Basin Commission (LCBC) is also engaged in several water resources and ecological projects that cover part of the NSAS and are working with UNDP and AfDB on two recent GEF Lake Chad projects. Other shared experiences may include the Guarani aquifer system in Latin America. The project will also work closely as a partner with the GEF IW:LEARN to help share the lessons and experiences of the project to the global IW community.

The international partners (UNDP as the GEF IA, UNESCO-IHP as the Implementing Partner, together with a number of partners such as IAEA, FAO, WWAP, IGRAC, AIDA, Sant'Anna School of Advanced Studies and IIASA) will contribute through their extensive baseline of activities on groundwater and surface water management through research actions and GEF projects executed globally, including:

UNDP is implementing programmes and projects across this region to assist countries and communities address land and water issues (including at the transboundary level), drought preparedness, and climate change, variability and adaptation. In addition, training resources from the UNDP CapNet (International network for Capacity Building in Integrated Water Resources Management) will be utilised to further assist the strengthening of IWRM capacity within national ministries and institutions within Component 2 of this project.

UNESCO-IHP is continuously active in the region through the cooperation in various national and international projects and initiatives, as well as through the UNESCO Water Family - a network composed of over 70 water-related Category 2 Centres and UNESCO Chairs, the World Water Assessment Programme (WWAP), and more than 160 IHP National Committees in Member States -, and through UNESCO's Offices in Cairo, Khartoum, and Yaoundé. The following UNESCO Centres and Chairs based in the Nubian countries will participate in the activities of the project: the UNESCO Regional Centre for Training and Water Studies of Arid and Semi-Arid Zones (RCTWS), Central Laboratory for Environmental Quality Monitoring at El-Qanater (CLEQM), Regional Centre for Shared Aquifer Resources Management (RCSARM), Regional Centre on Capacity Development and Research in Water Harvesting (RCWH), Chair on Water in Desert and Arid Zones, Chair in Water Resources, and Chair for Women in Sciences and Technology.

Since 1995, the Observatory of the Sahara and the Sahel (OSS) and UNESCO established a fruitful cooperation for the development of dialogue platforms between countries sharing non-renewable water resources and joined efforts to address the issues of the limited resources in the area.

UNESCO-IHP will be the Implementing Partner for this project. It will manage the project, provide scientific oversight and technical assistance on groundwater resources management and governance, national and JA legal and institutional reforms, enhancing the Joint Authority's efficiency and communication, develop training schemes and pilot studies coordination.

A good understanding of the hydrogeological characteristics and dynamics of aquifer systems, as well as addressing the socio-economic, environmental, legal and institutional aspects is crucial to set governance and management frameworks. In response to such challenges and upon request of its Member States, UNESCO-IHP launched in 2002 a global multi-partner initiative, the International Shared Aquifer Resources Management (ISARM) programme, aiming at (i) providing support to Member States in conducting an inventory of transboundary aquifers by assessing their hydrogeological characteristics, as well as addressing the socio-economic, environmental, legal and institutional aspects; and (ii) providing guidance to Member States towards the sustainable management and governance of shared groundwater resources. Since its start, ISARM has launched a number of global and regional initiatives. These are designed to inventory, map, delineate and analyse shared aquifer systems and to encourage riparian states to work cooperatively toward mutually beneficial and sustainable aquifer development. So far, around 600 transboundary aquifers have been identified by UNESCO IHP in coordination with Member States and IHP National Committees.

In 2008, the 63rd session of the UN General Assembly (UNGA) adopted Resolution A/RES/63/124 on the Law of Transboundary Aquifers, which includes in its annex “Draft Articles” of that law, prepared with the scientific support of UNESCO-IHP. The Resolution “...encourages the States concerned to make appropriate bilateral or regional arrangements for the proper management of their transboundary aquifers taking into account the provisions of the draft articles...”. The last resolution of the UNGA on this topic, adopted in December 2016 (A/RES/71/150), commends to the attention of Governments the draft articles on the law of transboundary aquifers as guidance for bilateral or regional agreements and arrangements for the proper management of transboundary aquifers, recognizes UNESCO IHP efforts and encourages it to continue its contribution by providing further scientific and technical assistance. In addition, UNESCO-IHP and the United Nation Economic Commission for Europe (UNECE) are currently undertaking joint activities in order to promote the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention, Helsinki 1992), which aims to protect and ensure the quantity, quality and sustainable use of transboundary water resources by facilitating cooperation. In November 2012, the Parties of the Convention adopted a Resolution recognizing UNESCO expertise in the subject of transboundary aquifers and strengthening their cooperation for the promotion of the Water Convention and its Model Provisions on Transboundary Groundwaters. These provisions are based on the principles of the Draft Articles and the Water Convention is a global instrument open to all countries since February 2013, providing an improved framework for UNESCO activities on transboundary aquifers.

The Draft Articles on the Law of transboundary aquifers, together with the two global water conventions, the UNECE Water Convention and the Convention on the Law of the Non-navigational Uses of International Watercourses (UN Water Convention, New York 1997) will provide the global policy advice and guidance and legal backbone to support legal, policy and institutional review and reform proposals within the NSAS.

UNESCO-IHP will also make use of its tools for data collection and groundwater monitoring, such as the IHP-Water Information Network System. Launched on January 31, 2017, IHP-WINS is a tool freely made available to Member States by UNESCO-IHP, with the objective to provide them with an open access, web-based platform as a global reference on water related issues at all levels. Through IHP’s contributions and sharing of various open access data, IHP-WINS is gradually building a repository of sources of information from UN organizations, regional organizations, national institutions and research centres, etc.. As a result, IHP-WINS provides data on the water cycle in its entirety, and offers a unique space for interdisciplinary collaboration and knowledge sharing among water stakeholders. On the platform, Member States are free to share any type of information related to water. Although

data hosted on IHP-WINS will mostly be in the form of GIS layers that can be overlaid for users to visualize information and create maps, data can also be shared in various other formats (i.e. images, videos, PDF, webinars, etc.). Data can be of various scales (global, regional, national and local), and can relate to any aspects of water resources (quality, quantity, governance, risk, use, supply, groundwater, gender, SDG6 targets and indicators, etc.). Both quantitative data and qualitative data are welcomed on the platform. IHP-WINS already included the GEF Transboundary Waters Assessment Programme (TWAP) data. IHP-WINS would be a contribution from UNESCO to the project that the Joint Authority and the Nubian project in general could use.

the IAEA will continue to support UNDP-GEF activities in the NSAS based on the requests sent directly to the Agency by the four participating countries (Chad, Egypt, Libya and Sudan) in relation to the development of a TC project within the TC programme cycle 2020-2021. The proposal could be formulated to address aspects of Component 1 of the draft project document (Component 1: Collaborative actions to further validate the functioning of the NSAS and its resources) and that there is an opportunity to use isotope hydrology to better characterise the NSAS in support of the Strategic Action Plan. Meanwhile, the IAEA will continue to execute isotope hydrology projects such as the one being done under the Sahel project and regional activities, which will benefit the UNDP-GEF project through the sharing of knowledge on approaches to isotope methods and data interpretation. In particular, the planned programmes of continuing actions on isotope hydrology in the Sahel are expected to be highly relevant.

The Food and Agriculture Organization of the United Nations (**FAO**) is a specialised agency of the United Nations that leads international efforts to eradicate hunger, food insecurity and malnutrition; to fight poverty and drive forward of economic and social progress for all; and to ensure the sustainable management and use of natural resources, including groundwater resources. Serving both developed and developing countries, FAO acts as a neutral forum where countries meet as equals to negotiate agreements and debate policy.

Specifically, the Land and Water Division of FAO works to promote coherent approaches to sustainable land and water management and governance. As part of this work, it led the Global Groundwater Governance project, a global partnership programme between UNESCO-IHP, the International Association of Hydrogeologists (IAH), the World Bank, the Global Environment Facility (GEF) and FAO. The programme produced several key documents, most notably a global vision and the *Global Framework of Action for Groundwater Governance*, outlining a set of principles for policies, legislation, regulations and customary practices.

Once the global programme ended, FAO began a pilot project in three countries – Morocco, Tunisia and Jordan – with the goal of applying the *Global Framework of Action* at aquifer level and supporting local stakeholders to improve groundwater governance. The work started with a diagnostic study to better understand the hydrogeological and governance context and to identify specific activities to involve more directly water users in decisions made around the use of the respective aquifers. FAO will share experiences and lessons learnt and contribute to the “Groundwater governance” training activities foreseen for the NSAS.

At the same time, FAO is working to improve data and monitoring of water efficiency, productivity and sustainability through remote sensing, and to provide policy support, for example through the Regional Collaboration Platform on Water Scarcity, and on topics, such as the use of solar-powered irrigation, particularly when it comes to groundwater user. Finally, FAO works on projects, like its response programme to El Nino-driven emergencies to protect food and nutrition security.

Water assessments cannot be realistic without a gender perspective. The World Water Assessment Programme (**WWAP**) Gender Toolkit for collection of sex-disaggregated data developed by the UN World Water Assessment Programme of UNESCO provides a first step towards a transformative process in the way water is managed in the future. The groundbreaking project for 'Gender Sensitive Water Monitoring Assessment and Reporting' developed a methodology for collection and analysis of key sex-disaggregated water data that is currently being implemented in the UNESCO-IHP Governance of Groundwater Resources in Transboundary Aquifers (GGRETA) project and will be implemented in the NSAS. The contribution of WWAP to the project will aim at mainstreaming gender within the NSAS. WWAP will deliver tailored-made training to increase the capacity of government representatives and water managers in collecting sex-disaggregated data in order to facilitate transboundary cooperation in aquifer governance.

IGRAC, the International Groundwater Resources Assessment Centre, is a UNESCO centre that works under auspices of WMO and is supported by the Government of The Netherlands. IGRAC specialises in regional and transboundary level assessment and monitoring of groundwater resources. IGRAC's mission is to contribute to world-wide availability of relevant information and knowledge on the groundwater resources of the world, with particular emphasis on developing countries, in order to support sustainable utilisation and management of the groundwater resources, to promote the role of groundwater in integrated water resources planning and elucidate the impact of groundwater on the ecosystems of the Earth. IGRAC will contribute to the project's training programme by providing groundwater monitoring trainings.

AIDA, the International Association for Water Law, will contribute to the policy, legal and institutional related project activities. AIDA's focus is to foster the evolution, study, knowledge, understanding and application of water law, national and international, with a view to raising awareness, and the knowledge and practice, of this field of the law of natural resources.

The FREE and open-source for WAT (FREEWAT) resources management is an Horizon 2020 project financed by the EU Commission (2014-2017, \$1 million grant). It is an innovative participatory approach gathering technical staff and relevant stakeholders, including policy and decision makers. The main purpose is to design scenarios for the proper application of conjunctive water policies. The consortium (19 institutions) coordinated by The Institute of Life Sciences of Scuola Superiore **Sant'Anna** (Sant'Anna School of Advanced Studies, Pisa, Italy) of which UNESCO-IHP coordinates the Capacity Building component will also contribute to the project by providing groundwater modelling trainings using the FREEWAT platform. The Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna is an Italian public university specialised in applied sciences, ranked within the most important 200 universities at world scale. It aims to pave innovative pathways in education and research, responding to the modernization and innovation needs of the society.

The International Institute for Applied Systems Analysis (IIASA) will collaborate as well with UNESCO-IHP within the framework of this project to develop a scenario model for the NSAS.

3.3 Risk and assumptions

A full UNDP risk management template is attached as annex A. The main risks and mitigation strategies can be summarised as:

Risk	Rating (H/M/L)	Mitigation Strategy
Political stability	H	International support for this regional project will provide some additional assistance to maintaining political stability within the region but it is clearly recognized that ongoing political uncertainty and poor security may limit project implementation progress, particularly in Libya. The location of the pilot projects will be selected to minimise security risks and transport issues associate with remote locations.
National Financial commitment (to the project and SAP implementation)	M	Economic recession concerns in a number of countries could affect the long-term sustainability of the project. Component 5 is specifically designed to identify a pipeline of actions that could be supported to aid full implementation of the SAP. The project team will also work closely with all governments to highlight any pending issues associated with government support for the project and work to find mitigation measure when/if needed.
National support for the Joint Authority	M	It is clear that although the JA has been in existence for a number of years there has been limited financial support from the countries to facilitate routine operation. The countries are all supportive of the JA and engaged in meetings. The financial needs of the JA for planned future activities will be assessed by the project. The project will assist with strengthening the legal basis for the JA and by providing capacity development for both the JA and corresponding national authorities.
Lack of qualified staff in the JA, regional offices and national institutions	M	The project's capacity strengthening activities and direct engagement in the project should assist with training staff linked to involvement of academic institutions (for all ages) to encourage women and men to become involved in water management.
Willingness to share information between countries	L -M	Although there has been limited data exchange through the NSAS Regional Information System (NARIS) the development of the SADA and the SAP has shown willingness of the countries to co-operate and share data. The project will continue to support the collaborative approach adopted in the previous GEF MSP to encourage data sharing.
Lack of NSAS monitoring infrastructure	M	Means of communication, means of transport to collect the data and feed NARIS especially in Sudan and Chad. The Project will need to encourage all countries to extend their monitoring networks

Risk	Rating (H/M/L)	Mitigation Strategy
Lack of national funds	L-M	Most countries of the NSAS have insufficient funds for water management. Through Component 5 the project will work with the countries and international organisations (potential donors, partners, etc.) to identify resources that could be used, post-project, to further effectively utilise the NSAS resources and protect the livelihoods of the population and the NSAS dependant ecosystems.
Engagement of national private sector stakeholders	M	The project has identified a number of national (and international) private sector groups. The project will provide training and awareness raising on effective use and management of the NSAS resource, and engage these stakeholders in pilot projects. The awareness raising will emphasise the benefits to these groups from improved use of groundwaters and protection of oasis. The project will work closely with local authorities to identify effective means to engage and maintain the interests for the private sector
Climate Change	M	If rainfall decreases further there will be even greater reliance on the NSAS resources as rainfall harvesting and river flows will be diminished (where available). The project will work closely with the countries on potential climate change scenarios and will work to help countries best adapt to reduced rainfall by utilising limited resources more effectively (e.g. introducing improved irrigation methods)

As per standard UNDP requirements, the Project Manager will monitor risks quarterly and report on the status of risks to the UNDP-IRH. The UNDP-IRH will record progress in the UNDP ATLAS risk log. Risks will be reported as critical when the impact and probability are high (i.e. when impact is rated as 5, and when impact is rated as 4 and probability is rated at 3 or higher). Management responses to critical risks will also be reported to the GEF in the annual Project Implementation Report (PIR).

3.4 Social and environmental safeguards

The project is rated as 'Category – Low' from an environmental and social safeguard perspective with small-scale, site-specific and manageable environmental and social impacts, No adverse long-term impacts from the project's activities are expected. During the project inception phase, the PMU will develop an Environmental and Social Management Framework (ESMF) that will provide guidance and measures to minimise adverse impacts with clear roles and responsibilities, along with required capacity strengthening required for effective implementation and monitoring. The Framework will provide key steps for screening all project components, outline procedures for preparing, reviewing, clearing, disclosing and monitoring all project-specific Environmental and Social Impact Assessments

(ESIAs) / Environmental and Social Management Plans (ESMPs). A completed UNDP Social and Environmental Screening assessment is included in Annex E.

3.5 Stakeholder engagement

Through the development of the SADA, a detailed stakeholder analysis was performed (Section 8). From this analysis, the counties have identified the following important stakeholder groups that will have an active role in the project. During the Project Inception phase participants of the Project Steering Committee, drawn from these groups, will be confirmed to ensure there is good involvement from key sectors of society, industry and government on the overall management and governance of the project.

Stakeholder Groups	Role in Project
<p>Government Ministries, including:</p> <ul style="list-style-type: none"> • Ministries of Water • Ministries of Environment and Natural Resources • Ministries of Agriculture • Ministries of Energy • Ministries of Industry • Ministries of Development • Ministries of Oil 	<p>Governments are the primary stakeholders who fully participate and derive benefits in participation in the activities of the management of the NSAS individually and through the JA. They are motivated by the need to protect and preserve the NSAS as a common resource that supports the livelihood of the basin’s population and the dependent ecosystem. The central governments play an important role in defining policies, guide principles and providing funding across all components in the project.</p>
<p>Joint Authority of the NSAS</p>	<p>As a main stakeholder and beneficiary of this project (and through national governments) the JA will play an active role in the management (through the PSC) and gain capacity (through all components) to fulfil their role of co-ordination and assessment of the NSAS water and water-dependent ecosystem resources.</p>
<p>Local Government/Authorities, including:</p> <ul style="list-style-type: none"> • Governorates /Province • Town/village • 	<p>Local authorities will play a key role in the execution of the four pilot actions and other relevant activities to highlight the advantages in water conservation and protection procedures demonstrated at local/sub-regional levels through component 4.</p>
<p>Private Sector, including:</p> <ul style="list-style-type: none"> • Farmers’ associations (small and medium sized operations) • International growers • Oil industry • Water bottling industry 	<p>Private sector organisations from water users (including irrigators) will be encouraged to participate in all activities of the project (meetings, training sessions, pilot, etc.) to motivate them to be ‘involved’ in the protection of the NSAS resources. Their role in the longer-term implementation of the SAP and the sustainability of the actions of this project through, for example, upscaling of actions to reduce water usage, will be imperative.</p>
<p>Academia/ Research institutes including:</p> <ul style="list-style-type: none"> • e.g. Egypt National Water Research Centre including the National 	<p>The universities and schools will be important to providing appropriate education on the NSAS and water/ecosystem issues. Together with water research institutions who will help guide the activities of the project, they will benefit from information delivered by the project and targeted training</p>

Stakeholder Groups	Role in Project
Research Institute for Groundwater <ul style="list-style-type: none"> • Schools • Universities • Sahara and Sahel Observatories 	courses on governance, technical management of NSAS, civil society engagement, etc.
NGOs/CSOs , including: <ul style="list-style-type: none"> • Water boards/associations • Women’s associations /councils • Communities 	Local inhabitants and non-governmental organisations will be encouraged to participate in the project’s meetings and appropriate training sessions. The project will provide awareness raising material (both in written form and given verbally) to ensure that the issues facing the NSAS are understood to those using the resource. Through the pilot actions local communities are expected to have an important role and will be able to see, at first hand, the benefits of the approaches demonstrated to facilitate sustainability and uptake.

3.6 Mainstreaming gender

Water assessments cannot be realistic without a gender perspective. The WWAP Gender Toolkit for collection of sex-disaggregated data developed by the UN World Water Assessment Programme of UNESCO provides a first step towards a transformative process in the way water is managed in the future. The ground-breaking project for ‘Gender Sensitive Water Monitoring Assessment and Reporting’ developed a methodology for collection and analysis of key sex-disaggregated water data that is currently being implemented in the UNESCO-IHP Governance of Groundwater Resources in Transboundary Aquifers (GGRETA) project. WWAP can deliver tailored-made training to increase the capacity of government representatives and water managers in collecting sex-disaggregated data in order to facilitate transboundary cooperation in aquifer governance.

The project will endeavour to ensure that women and men are represented in the project management, governance and activities equally. More significant the project will engage in women’s groups throughout the region to understand how the work can best assist them with local water management issues in-line with the SAP implementation. In recognition of nomadic lifestyles where men are often travelling for long periods with livestock, awareness raising information will be provided (both in written form and verbally) to strengthen women’s understanding of the NSAS water and ecosystem resources and how best women can assist with crop irrigation and pollution reduction, for example. A gender strategy will be developed for gender mainstreaming within the NSAS during the inception of the project.

The Project Management Unit will be staffed with considerations of gender balance and will promote the intervention of women within the project and their participation throughout the activities of the project including the training programme.

Through management and technical capacity training sessions the project will encourage a balance of women and men to further encourage the role of women in senior positions in water / ecosystem management and addressing the challenges of SAP implementation across the NSAS.

The contribution of WWAP to the project will aim at mainstreaming gender within the NSAS. Activities targeting and encouraging gender mainstreaming will include sex-disaggregated data assessment within the NSAS and improving the Nubian countries’ capacities in the collection and assessment of

sex-disaggregated data following the methodology developed by UNESCO WWAP. Training modules based on UNESCO WWAP Gender Toolkit will be designed and prepared, including field-testing.

Specific outputs and activities contributing to this gender marker assessment include:

- The development of a gender mainstreaming strategy (during the project inception phase), together with a communications/awareness strategy during the inception phase that will guide the overall project implementation and the involvement of women in the implementation of the SAP.
- Joint regional training modules carried out on gender mainstreaming (Activity 2.2.3 and 2.2.4);
- Output 3.3 (Gender-sensitive review of existing institutional settings and policies at national level in the four countries, and at regional level) and associated activities, have been added during the PPG phase
- Discussion of proposed reforms with key stakeholders (including women's groups), in the appropriate fora - domestically in each of the four countries, and regionally - with a view to achieving broad-based acceptance of the proposed reforms (Activity 3.1.4).
- Components 4 (pilots) and 5 (pre-feasibility assessments for investments) will also address gender issues following guidance from WWAP

For further details about gender activities, see Annex F.

3.7 South-South and Triangular co-operation (SSTrC)

The project will work closely with GEF IW:LEARN and related regional initiatives to further disseminate experiences and results. 1% of the GEF budget will be devoted to supporting IW:LEARN activities (including GEF IW Conferences, Experience Notes, Exchanges, participation in Communities of Practice, etc.). The project's international partners (UNDP, UNESCO, IAEA, FAO, WWAP, IGRAC, AIDA, Sant'Anna School of Advanced Studies) are all involved in water (surface and groundwater) projects in developing countries. The results of these projects will be disseminated through publications (including GEF Experience Notes) and exchange visits to other groundwater dependent regions through the GEF IW:LEARN twinning initiatives. Material on conjunctive use of surface water and groundwater prepared by IW:LEARN will be made available to the Nubian countries' experts. Similarly, experiences from other regions (including activities undertaken in other aquifer basins in North Africa) will be promoted through UNESCO-IHP and partners.

3.8 Sustainability and scaling-up

The project is building on the work undertaken by the IAEA-UNDP-GEF-UNESCO MSP that prepared the SADA and SAP. The implementation of the SAP (over 10 -20 years) will require considerable sustainability scaling-up of the project's work to enable the Joint Authority and four countries to complete the SAP implementation after the conclusion of the project.

As key actions to facilitate the sustainability and scaling-up, the project will be encouraging the countries to (where needed):

- Update and reform policies, legislation and institutions to enhance the national and regional governance of the NSAS;
- Strengthening governance capacity to implement any necessary reforms to policy etc.
- Strengthening capacity to manage the water and ecosystem resources within the region;

- To further strengthen the involvement of women at all levels of governance, management and activities within the region;
- Encouraging the routine provision of information and data to the JA by countries in accordance with the regional agreement;
- Strengthening the JA at the regional level and communities, private sector (including farmers, pastoralists, international growers, bottlers etc.) at more local levels on the importance of the NSAS resources and ecosystems dependent on the water;
- Improving the understanding of the NSAS resources and ecosystem and the potential impacts of climate change and variability
- Piloting improved approaches to water management across the NSAS, to demonstrate effective means to reduce water demand and pollution, and sustain fragile ecosystems that benefit local communities;
- Aiding the long-term sustainability and full completion of the SAP through identifying potential projects and programmes needing additional co-financing through prefeasibility studies.

At the JA level, the project's capacity building activities and exchanges with other regional water commissions will assist the JA analysing NSAS data producing technical reports and maps, updating the regional model and evaluating the refined local models. More fundamentally, the project will assist with reviews of the JA governance structures and operation to strengthen the regional and national offices of the JA. The project will work with the ministries for water and environment to facilitate their understanding of the NSAS resources.

The work to develop appropriate sustainability plans will be integral to the project's exit strategy and all activities will closely consider the sustainability of interventions as part of the project inception phase.

4 PROJECT MANAGEMENT

4.1 Cost efficiency and effectiveness

The project will strengthen the governance and management of water resources at the local, national and regional (NSAS) levels, through enhanced stakeholder capacity to monitor, plan and managed water resources and associated ecosystems whilst encouraging sustainable livelihood development.

The project will strengthen the capacity of the Joint Authority and associated national organisations to enable the implementation of the SAP. The endorsement of the SAP, by ministers from the four countries, demonstrates the countries' commitment to the long-term environmental and socio-economic objectives within the SAP. Implementing regional and national policies and institutional reforms agreed under the SAP and strengthening the knowledge base on the NSAS will facilitate the governance of the basin. Through the implementation of the project (and the SAP) the JA will become more effective as a regional institution to address the increasing pressures that will be placed on the resources of the NSAS from increasing population and potential climate changes.

Close co-operation with the partners' on-going activities addressing groundwater issues in the region and more widely, will enable the project to gain additional knowledge on good practices to manage use demand of the NSAS. Through twinning exercises promoted by the GEF IW:LEARN project there will be opportunities to visit other transboundary water management organisations, etc. The foundational work undertaken by the UNDP, GEF, IAEA and UNESCO to develop the SADA and SAP has resulted in a significant baseline of knowledge on the threats and possible solutions impacting the NSAS. UNESCO-IHP and partners will be central to assisting the countries address some remaining uncertainties and to guide the initial SAP implementation stages.

The project's efficiency is enhanced by capitalising on the pre-existing Joint Authority that will be central to this project.

All actions are important to varying degrees and are complementary to each other. However, the following are considered particularly effective and useful at the national level:

- Capacity building for monitoring, hydrogeological mapping and modelling
- Devising regional policy and guidelines for water allocation, water use and priorities
- Devising regional policy to establish cooperation and to include ecosystem and biodiversity conservation in the integrated management of the NSAS
- Enhancing legal and institutional structure of the JA

4.2 Project management

Information on governance and management arrangements including Project Management Unit (PMU) to be hosted within the NSAS countries, can be found under Section 8.

4.3 Agreement on intellectual property rights and use of logo on the project's deliverables and disclosure of information:

In order to accord proper acknowledgement to the GEF for providing grant funding, the GEF logo will appear together with the UNDP logo on all promotional materials, other written materials like publications developed by the project, and project hardware. Any citation on publications regarding projects funded by the GEF will also accord proper acknowledgement to the GEF. Information will be

disclosed in accordance with relevant policies notably the UNDP Disclosure Policy¹¹ and the GEF policy on public involvement¹².

¹¹ See http://www.undp.org/content/undp/en/home/operations/transparency/information_disclosurepolicy/

¹² See https://www.thegef.org/gef/policies_guidelines

5 PROJECT RESULTS FRAMEWORK

This project will contribute to the following Sustainable Development Goal (s): Direct benefit to understanding and reporting: SDG 6 (water), 15 (life on land). Indirect benefit to: 2 (food); 5 (gender), 13 (climate)

This project will contribute to the following country outcome included in the UNDAF/Country Programme Document:

Chad: (2017 – 2021) Outcome: By 2021, farms, fishing communities and small producers, notably youth and women, in targeted regions, use sustainable production systems that allow them to meet their needs, bring food to market and adopt a living environment that is more resilient to climate change and other environmental challenges.

Egypt: (2013-2017): Outcome 5.3: The Government of Egypt and local communities have strengthened mechanisms for the sustainable management of, and access to, natural resources such as land, water and ecosystem

Libya: There is no UNDAF programme for Libya

Sudan (2018 -2021): Outcome 2: By 2021, people’s resilience to consequences of climate change, environment stresses and natural hazards is enhanced through strengthened institutions, policies, plans and programmes

This project will be linked to the following output of the UNDP Strategic Plan:

Output 2.5: Legal and regulatory frameworks, policies and institutions enabled to ensure the conservation, sustainable use, and access and benefit sharing of natural resources, biodiversity and ecosystems, in line with international conventions and national legislation.

Indicator 2.5.1: Extent to which legal or policy or institutional frameworks are in place for conservation, sustainable use, and access and benefit sharing of natural resources, biodiversity and ecosystems.

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
Project Objective: Initiate national and regional SAP implementation by facilitating legal, policy and institutional reforms and addressing knowledge gaps identified in the SAP, supporting rational and equitable integrated management, socio-economic development and the protection of the dependent ecosystem and resources of the NSAS in the Nubian Countries	Indicator 2.5.1: Extent to which legal or policy or institutional frameworks are in place for conservation, sustainable use, and access and benefit sharing of natural resources, biodiversity and ecosystems.	The JA is established but limited sharing of data and information. SAP approved by all countries on the NSAS resources and ecosystem. Limited knowledge on the oases ecosystems	Updated information on national policies/institutions to protect /conserve water and ecosystem resources	New policies recommended for national and regional water and ecosystem conservation across the NSAS	Full active participation in the project by countries and collaboration with related on-going projects
	NAPs submitted for national approval to mainstream the key objectives outlined in the SAP to achieve 'rational and equitable' management of the NSAS	No NAPs	Draft NAPs prepared Awareness raising of the NSAS initiated in all countries	Draft NAPs presented to governments for approval Reports available on the socio-economic importance of the NSAS to all countries Ecosystem dependence on NSAS agreed and protection measures recommended	
	JA demonstrates increased capacity through the utilisation of data from agreed programme of activities to aid regional management of the NSAS	JA has agreed protocols for data exchange	JA and the countries agree joint programme for strengthened understanding of NSAS	Joint programme of activities initiated	

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
	Donors' conference initiates additional support for NSAS SAP activities	N/A	-	Potential actions for support assessed and reported to PSC/Donors' meeting	
Component 1 Collaborative actions to further validate the functioning of the NSAS and its resources.					
Outcome 1: Strengthened common understanding of the conceptual model and functioning of the NSAS, taking account of potential climate change and variability threats, based on the agreed methodology and data as basis of regional and national land and water resources management decision making	Indicator: Assessment report on the NSAS conceptual model including the time dimension (seasonal, variations and observed/predicted long-term trends)	A good general knowledge of the geology, including subsurface stratigraphy relevant to the project's objectives exists. However NSAS countries lack: (i) a standardized, modern and harmonized characterization of the current state of groundwater resources, (ii) a set of quantity, quality, ecological functions, socio-economic factors and current uses, and (iii) the assessment of the vulnerability to pollution and climate change	Evaluation, harmonization and validation of previous findings (e.g. modelling, remote sensing, isotopic data, etc...)	Assessment report including new geological and hydrogeological maps on the basis of existing data/information endorsed by the 4 countries.	Cooperation between multiple technical and scientific working groups is maintained throughout the aquifer characterization

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
	Indicator: Updated joint harmonized database for the NSAS monitoring according to local needs (including training).	Limited monitoring equipment is available in the region. Protocols exist with the JA to exchange data, but a systematic indicator based groundwater monitoring system is absent in the region as access to monitoring boreholes is difficult	Design of monitoring network Data collection network activated in the 4 countries Quality check of data collected and control procedures developed with JA and countries Network ready for implementation by year 3	Joint harmonized database established Monitoring network established Monitoring protocols developed with countries and JA	Countries and data owners agree to contribute data and information, and to make data freely available Relevant national and local authorities, groundwater users, owners of groundwater wells, and all stakeholders cooperate in the design of the monitoring network National authorities adopt the monitoring protocols and commit to its full implementation

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
	Indicator: Assessment report on the vulnerability of oases ecosystems considering the evolution of demands in relation to agriculture and population dynamics among other economic developments	Limited data appear to be available on the condition of terrestrial and oases ecosystems and there is a need to identify endemic and migratory species at risk and to develop a prioritized biodiversity inventory	Regional meeting with actors and civil society to validate the data collected, the outline and ToC of the assessment report	Endorsement of the report by the 4 countries	Active participation of national representatives committed to consider recommendations on domestic legislation and institutional improvement
Component 2 Strengthening capacity of national organisations and the Joint Authority, in-line with SAP, to manage the NSAS resources in a rational and equitable manner					
Outcome 2: Operationally strengthened National and Regional Authorities with sufficient technical and managerial capacities to jointly manage the NSAS towards its rational and equitable utilization that maximizes socioeconomic benefits while protecting critical	Indicator: Proposal assessed and developed towards establishment of joint modelling centre	Various models for the NSAS; their suitability for future needs to be assessed	Diagnostic of modelling needs and activities to be carried out within framework of project identified	Prefeasibility study for establishment of modelling centre and proposal communicated to JA and countries	Active participation of national representatives committed to provide inputs to the diagnostic of modelling needs
	Indicator: Information Management System database prepared and populated	The Nubian Aquifer Information System (NARIS) is outdated and does not meet modern operational requirements	Data needs to be uploaded on IMS assessed and agreed by the 4 countries and the JA	Endorsement by the 4 countries and the JA of the IMS as documented in the meetings of the relevant meetings.	Countries and data owners agree to contribute data and information, and to make data freely available Relevant national and local authorities, groundwater

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
ecosystems dependent upon NSAS				Database developed and populated with data collected from countries	users, owners of groundwater wells, and stakeholders cooperate in the design and testing of the information system National authorities adopt the information system and commit to its full implementation
	Indicator: Support to GEF IW:LEARN related activities	N/A	Preparation of project guidance and strategies on gender, KM, stakeholder engagement (utilising experiences from IWL) Preparation of 1 experience note Participation in 1 IW Conference At least one regional IW meeting	Preparation in 2 additional experience notes Participation in 2 nd IW conference At least one global IW:LEARN twinning undertaken	Willingness of national stakeholders to participate in GEF IW:LEARN events
	Indicator: Data and information protocols developed with JA and countries for adoption	Countries adopting fragmented approach to groundwater resources utilization with little consideration of transboundary implications and freshwater ecosystems sustainability	Discussion facilitated with JA and countries on development and adoption of protocols	Data and information protocols developed and endorsed by the 4 countries	National authorities adopt data and information protocols and commit to its full implementation

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
<p>Outcome 3: Trained stakeholders ensure environmentally and socially optimal development and protection of NSAS water and land resources and linked ecosystems</p>	<p>Indicator: Training programme developed at national and regional level on:</p> <ul style="list-style-type: none"> -groundwater governance including through dialogues and international experience -legal, institutional, policy aspects of groundwater resources management at domestic and regional level – national and international water law -water diplomacy, negotiation and drafting techniques -gender mainstreaming and sex-disaggregated data collection -stakeholder engagement and public participation -model use and maintenance -new isotope dating techniques -groundwater monitoring -best practices in regional management of shared water resources -JA trained on office running (e.g. staffing plans, internal policies, financial mgmt., M&E) 	<p>Building capacity in countries, in particular for concerns on groundwater exploration, exploitation and management is a high priority in the region</p>	<p>Needs assessed (topic and target audience: e.g. trainers, decision-makers, stakeholders) during inception of project towards project objective</p> <p>At least 1 training material prepared per topic</p> <p>National and joint regional trainings carried out</p>	<p>National and joint regional trainings carried out. For each topic listed, and in each project country, at least 2 technical and at least 2 managerial staff completed formal training (with special attention to gender and youth)</p> <p>For each topic listed, and in each project country, at least 1 stakeholder group targeted and participating in trainings</p> <p>Training material and training outcomes disseminated</p> <p>JA and country representatives engaged in dialogue with other transboundary water management institution through exchange study tour organized for JA and country representatives with other TWMI</p>	<p>National managerial staff and technical personnel trained through the project continue to operate within the relevant national agencies/institutions and local stakeholders continue to protect the resources after the project's closure</p>

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
				<p>Report on participation of country experts to project's activities</p> <p>Documentation certifying the successful attendance to formal training courses</p>	
Component 3 Enabling SAP implementation through legal, policy and institutional reforms at both national and regional levels					
Outcome 4: Improved regional and national legal, policy and institutional frameworks for the integrated management of joint NSAS resources	Indicator: National Action Programmes (NAPs) developed and submitted to governments	SADA summarised the key legal, policy and institution setting, the SAP identified potential gaps.	<p>Assessment review of - national policy environment</p> <p>-domestic regulatory framework</p> <p>-domestic institutional framework</p> <p>Stakeholders diagnostic is carried out in early stages of project (e.g. sex-disaggregated data collected) in order to e.g. identify stakeholder groups to involve in project (e.g. water users, farmers, private sector, women's groups)</p>	<p>Proposals formulated for desirable and achievable national policy, regulatory, and institutional reforms and updates for four countries. Proposals will conform to gender-responsive guiding principles.</p> <p>Proposals formulated through a participative process with key stakeholders</p> <p>Proposals submitted to governments</p>	

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
	Indicator: Joint Authority assessed, capacitated, and proposal developed for strengthened role and operationality	JA meets approximately annually but exchange of information and operational issues (e.g. 'managing the NSAS') is limited	<p>JA regional agreements, structure, operationality, funding are assessed</p> <p>Diagnostic discussed with key stakeholders (JA and/or domestic level)</p> <p>Capacity needs assessment is carried out and discussed with JA</p>	<p>Proposal formulated for desirable and achievable update and reform at JA level (procedural and substantive)</p> <p>Proposals discussed with key stakeholders Draft instrument (JA and/or domestic level) prepared and put forward</p> <p>Training programme is developed for JA towards JA operationality and initiation of SAP implementation</p> <p>Roadmap developed for reform sustainable implementation</p>	
	Indicator: national and regional institutional frameworks assessed from gender perspective	TBD	Gender-sensitive review of national policies and regional institutional framework		
Component 4 Implementing targeted pilot projects to validate environmentally and socioeconomically rational and equitable management approaches within the NSAS					

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
Outcome 5: National governments and the Joint Authority obtain practical experiences and 'upscaling potential' validation on appropriate ecosystem and water resource protection measures that support socio-economic development	Indicator: Implementation report on pilot projects selected	N/A	<p>Pilot demonstrations are reconfirmed and validated during early stages of project</p> <p>Evaluation of pilots alignment with country specific implementation structures and engagement models</p> <p>4 pilots initiated by mid-term</p> <p>Report prepared for mid-term finalising targets for number of stakeholders / groups engaged in project</p>	<p>All 4 pilot demonstrations are implemented</p> <p>Results and lessons learnt for implemented pilots are made available and disseminated</p> <p>Pilots achievements (with at least 3 stakeholder groups targeted in each pilot. Groups to be TBD during project inception, e.g. women, farmers)</p>	Validation of preselected sites will take place during the inception of the project

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
	Indicator: Replication strategies and sustainability plans developed	N/A	Preliminary indications about sustainability plan for the JA	<p>Report on replication/upscaling strategies and sustainability plans presented to countries and JA</p> <p>Sustainability plan for the JA</p> <p>-Development of indicators for pilot upscaling (e.g. sustainability of actions, gender aspects)</p> <p>-At least 2 upscaling sites within NSAS identified</p> <p>All countries have draft strategies</p> <p>At least 2 countries have identified resources to sustain pilots and seek opportunities to upscale</p> <p>Potential donors and partners at local/national/regional levels identified</p>	Countries will adopt the sustainability plan for the JA

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
Component 5 Pre-feasibility studies to identify NSAS investment opportunities					
Outcome 6: Assessment of stress reduction and livelihood strengthening activities identified in the SAP leads to a broad investment programme to further catalyse SAP implementation	Indicator: functional website	Updated information available on the functioning of the Joint Authority is scarce	Communication strategy is developed in early stages of project	Website is functioning and populated with key project material made available and published Website Number of pages visited	
	Indicator: A pre-feasibility report of Publication and dissemination of project material and lessons learnt	N/A	Preliminary indications about JA sustainability funding opportunities	Countries and JA discussed potential future investment programme for the NSAS JA funding sustainability At least 2 pre-feasibility studies completed Lessons learnt are identified and disseminated Replication sites, projects, investment areas are identified	Countries offer suggestion on potential projects for future investments

	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Assumptions
	<p>Indicator: Investment programme prepared and discussed by countries and JA for further SAP implementation</p> <p>Review of potential SAP investments completed</p>	N/A	-	<p>Preparation of further SAP implementation investment programme to benefits of countries and JA-at least 2 potential projects confirmed at national/regional level</p> <p>-Donor conference completed by year 4 (6 months prior to project closure) and potential donors are identified</p>	<p>Countries offer suggestion on potential projects for future investments</p>

6 Monitoring and Evaluation (M&E) Plan

The project results as outlined in the project results framework will be monitored annually and evaluated periodically during project implementation to ensure the project effectively achieves these results.

Project-level monitoring and evaluation will be undertaken in compliance with UNDP requirements as outlined in the [UNDP POPP](#) and [UNDP Evaluation Policy](#). While these UNDP requirements are not outlined in this project document, the UNDP will work with the relevant project stakeholders to ensure UNDP M&E requirements are met in a timely fashion and to high quality standards. Additional mandatory GEF-specific M&E requirements (as outlined below) will be undertaken in accordance with the [GEF M&E policy](#) and other relevant GEF policies¹³.

In addition to these mandatory UNDP and GEF M&E requirements, other M&E activities deemed necessary to support project-level adaptive management will be agreed during the Project Inception Workshop and will be detailed in the Inception Report. This will include the exact role of project target groups and other stakeholders in project M&E activities including the GEF Operational Focal Point and national/regional institutes assigned to undertake project monitoring. The GEF Operational Focal Point will strive to ensure consistency in the approach taken to the GEF-specific M&E requirements (notably the GEF IW Tracking Tools) across all GEF-financed projects in the countries.

M&E Oversight and monitoring responsibilities:

Project Manager: The Project Manager is responsible for day-to-day project management and regular monitoring of project results and risks, including social and environmental risks. The Project Manager will ensure that all project staff maintain a high level of transparency, responsibility and accountability in M&E and reporting of project results. The Project Manager will inform the Project Steering Committee and the UNDP-GEF RTA of any delays or difficulties as they arise during implementation so that appropriate support and corrective measures can be adopted.

The Project Manager will develop annual work plans based on the multi-year work plan included in Annex A, including annual output targets to support the efficient implementation of the project. The Project Manager will ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality. This includes, but is not limited to, ensuring the results framework indicators are monitored annually in time for evidence-based reporting in the GEF PIR, and that the monitoring of risks and the various plans/strategies developed to support project implementation (e.g. gender strategy, knowledge management strategy etc.) occur on a regular basis.

Project Steering Committee (PSC): The PSC will take corrective action as needed to ensure the project achieves the desired results. The PSC will hold project reviews to assess the performance of the project and appraise the Annual Work Plan for the following year. In the project's final year, the PSC will hold an end-of-project review to capture lessons learned and discuss opportunities for scaling up and to highlight project results and lessons learned with relevant audiences. This final review meeting will also discuss the findings outlined in the project terminal evaluation report and the management

¹³ See https://www.thegef.org/gef/policies_guidelines

response. The PSC is likely to comprise countries representatives, the JA, UNDP, and UNESCO-IHP and IAEA. The details of the membership of the PSC and roles/responsibilities on members and observers will be defined during the inception phase.

Project Implementing Partner (UNESCO-IHP): The Implementing Partner is responsible for providing all required information and data necessary for timely, comprehensive and evidence-based project reporting, including results and financial data, as necessary and appropriate. The Implementing Partner will strive to ensure project-level M&E is undertaken by national institutes, and is aligned with national systems so that the data used by and generated by the project supports national systems.

UNDP Istanbul Regional Hub: The Istanbul Regional Hub (IRH) will support the Project on national actions as agreed and ensure that the standard UNDP and GEF M&E requirements are fulfilled to the highest quality.

The IRH is responsible for complying with all UNDP project-level M&E requirements as outlined in the UNDP POPP. This includes ensuring the UNDP Quality Assurance Assessment during implementation is undertaken annually; that annual targets at the output level are developed, and monitored and reported using UNDP corporate systems; the regular updating of the ATLAS risk log; and, the updating of the UNDP gender marker on an annual basis based on gender mainstreaming progress reported in the GEF PIR and the UNDP ROAR. Any quality concerns flagged during these M&E activities (e.g. annual GEF PIR quality assessment ratings) must be addressed by the IRH and the Project Manager.

The IRH will retain all M&E records for this project for up to seven years after project financial closure in order to support ex-post evaluations undertaken by the UNDP Independent Evaluation Office (IEO) and/or the GEF Independent Evaluation Office (IEO).

UNDP-GEF Unit: Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP-GEF Regional Technical Advisor and the UNDP-GEF Directorate as needed.

The Audit: The project will be audited as per UNDP Financial Regulations and Rules and applicable audit policies set out in the Programming and Finance manuals by the legally recognized auditor.

Additional GEF monitoring and reporting requirements:

Inception Workshop and Report: A project inception workshop will be held within two months after the project document has been signed by all relevant parties to, amongst others:

- a) Re-orient project stakeholders to the project strategy and discuss any changes in the overall context that influence project strategy and implementation;
- b) Discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms;
- c) Review the results framework and finalize the indicators, means of verification and monitoring plan;
- d) Discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E budget; identify national/regional institutes to be involved in project-level M&E; discuss the role of the GEF OFP in M&E;

- e) Update and review responsibilities for monitoring the various project plans and strategies, including the risk log; Environmental and Social Management Plan and other safeguard requirements; the gender strategy; the knowledge management strategy, and other relevant strategies;
- f) Review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; and
- g) Plan and schedule Project Board meetings and finalize the first year annual work plan.

The Project Manager will prepare the inception report no later than one month after the inception workshop. The inception report will be cleared by the Implementing Partner, the UNDP-GEF Regional Technical Adviser, and will be approved by the PSC.

GEF Project Implementation Report (PIR): The Project Manager, Implementing Partner and the UNDP-GEF Regional Technical Advisor will provide objective input to the annual GEF PIR covering the reporting period July (previous year) to June (current year) for each year of project implementation. The Project Manager will ensure that the indicators included in the project results framework are monitored annually in advance of the PIR submission deadline so that progress can be reported in the PIR. Any environmental and social risks and related management plans will be monitored regularly, and progress will be reported in the PIR.

The PIR submitted to the GEF will be shared with the PSC. UNDP will coordinate the input of the GEF Operational Focal Point and other stakeholders to the PIR as appropriate. The quality rating of the previous year's PIR will be used to inform the preparation of the subsequent PIR.

Lessons learned and knowledge generation: Results from the project will be disseminated within and beyond the project intervention area through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to the project. The project will identify, analyse and share lessons learned that might be beneficial to the design and implementation of similar projects and disseminate these lessons widely. There will be continuous information exchange between this project and other projects of similar focus in the same country, region and globally.

GEF Focal Area Tracking Tools: The following GEF Tracking Tool(s) will be used to monitor global environmental benefit results: list the required GEF Tracking Tool(s), as agreed with the UNDP-GEF Regional Technical Advisor. The baseline/CEO Endorsement GEF Focal Area Tracking Tool(s) – submitted as Annex D to this project document – will be updated by the Project Manager/Team (not the evaluation consultants hired to undertake the MTR or the TE) and shared with the mid-term review consultants and terminal evaluation consultants before the required review/evaluation missions take place. The updated GEF Tracking Tool(s) will be submitted to the GEF along with the completed Mid-term Review report and Terminal Evaluation report.

Independent Mid-term Review (MTR): An independent mid-term review process will begin after the second PIR has been submitted to the GEF, and the MTR report will be submitted to the GEF in the same year as the 3rd PIR. The MTR findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the final half of the project's duration. The terms of reference, the review process and the MTR report will follow the standard templates and guidance prepared by the UNDP IEO for GEF-financed projects available on the [UNDP Evaluation Resource Center \(ERC\)](#). As noted in this guidance, the evaluation will be 'independent, impartial and rigorous'. The consultants that will be hired to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. The GEF Operational Focal Point and other stakeholders will be involved and

consulted during the terminal evaluation process. Additional quality assurance support is available from the UNDP-GEF Directorate. The final MTR report will be available in English and will be cleared by UNDP-GEF Regional Technical Adviser, and approved by the PSC.

Terminal Evaluation (TE): An independent terminal evaluation (TE) will take place upon completion of all major project outputs and activities. The terminal evaluation process will begin three months before operational closure of the project allowing the evaluation mission to proceed while the project team is still in place, yet ensuring the project is close enough to completion for the evaluation team to reach conclusions on key aspects such as project sustainability. The Project Manager will remain on contract until the TE report and management response have been finalized. The terms of reference, the evaluation process and the final TE report will follow the standard templates and guidance prepared by the UNDP IEO for GEF-financed projects available on the [UNDP Evaluation Resource Center](#). As noted in this guidance, the evaluation will be ‘independent, impartial and rigorous’. The consultants that will be hired to undertake the assignment will be independent from organizations that were involved in designing, executing or advising on the project to be evaluated. The GEF Operational Focal Point and other stakeholders will be involved and consulted during the terminal evaluation process. Additional quality assurance support is available from the UNDP-GEF Directorate. The final TE report will be cleared by the UNDP-GEF Regional Technical Adviser and will be approved by the PSC. The TE report will be publicly available in English on the UNDP ERC. Once uploaded to the ERC, the UNDP IEO will undertake a quality assessment and validate the findings and ratings in the TE report, and rate the quality of the TE report. The UNDP IEO assessment report will be sent to the GEF IEO along with the project terminal evaluation report.

Final Report: The project’s terminal PIR along with the terminal evaluation (TE) report and corresponding management response will serve as the final project report package. The final project report package shall be discussed with the PSC during an end-of-project review meeting to discuss lesson learned and opportunities for scaling up.

Mandatory GEF M&E Requirements and M&E Budget:

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget ¹⁴ (US\$)		Time frame
		GEF grant	Co-financing	
Inception Workshop	Project Manager Implementing Partner	30,000	20,000	Within two months of project document signature
Inception Report	Project Manager Implementing Partner	None	None	Within two weeks of inception workshop

¹⁴ Excluding project team staff time and UNDP staff time and travel expenses.

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget ¹⁴ (US\$)		Time frame
		GEF grant	Co-financing	
Standard UNDP monitoring and reporting	PMU Implementing Partner UNDP RTA	None	None	Quarterly, annually
Monitoring of indicators in project results framework	PMU Implementing Partner	None	20,000	Annually
GEF Project Implementation Report (PIR)	Project Manager Implementing Partner UNDP-GEF team	None	None	Annually
Lessons learned and knowledge generation	Project Manager	20,000	10,000	Annually
Project Steering Committee meetings	Project Board Project Manager Implementing Partner	60,000	30,000	At minimum annually
Mid-term GEF Tracking Tool	Project Manager	5,000	20,000	Before mid-term review mission takes place.
Independent Mid-term Review (MTR) and management response	Implementing Partner, PMU and UNDP-GEF team	25,000	10,000	Between 2 nd and 3 rd PIR.
Terminal GEF Tracking Tool	Project Manager	5,000	20,000	Before terminal evaluation mission takes place
Independent Terminal Evaluation (TE)	Implementing Partner, PMU and UNDP-GEF team	35,000	10,000	At least three months before operational closure
TOTAL indicative COST Excluding project team staff time, and UNDP staff and travel expenses		USD 180,000	140,000	

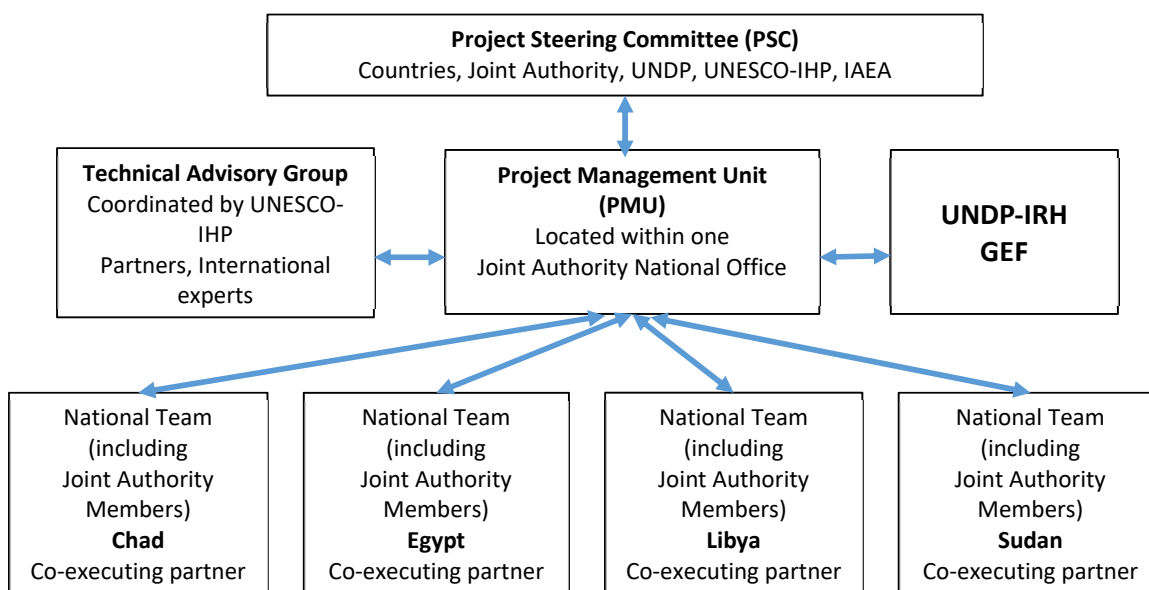
7 Governance and Management Arrangements

GEF Agency

UNDP Istanbul Regional Hub (IRH) will act as the lead UNDP office, Principal Project Representative, and will be responsible for overall project supervision and implementation project through Agency execution modality with UNESCO. UNDP will be represented at the Project Steering Committee by IRH Manager delegated to the UNDP/ GEF International Waters Regional Technical Advisor. Project Assurance from IRH will be provided by the Senior Programme Coordinator.

The **Implementing Partner** for this project is **UNESCO-IHP**. The Implementing Partner is responsible and accountable for managing this project, including the monitoring and evaluation of project interventions, providing technical assistance on groundwater resources management and governance, national and JA legal and institutional reforms, enhancing the Joint Authority's efficiency and communication, develop training schemes and pilot studies coordination. UNESCO-IHP will supervise activities with the aim of achieving project outcomes and for the effective use of UNDP resources. UNESCO will have the responsibility to secure the establishment and supervision of the Project Management Unit (PMU). **The national focal agencies will closely coordinate with UNESCO-IHP acting as co-executing partners.** The UNESCO Water Family entities based in the region will contribute actively to the project. This includes UNESCO's water-related Category 2 Centres in the four countries (UNESCO Regional Centre for Training and Water Studies of Arid and Semi-Arid Zones (RCTWS), Centre Central Laboratory for Environmental Quality Monitoring at El-Qanatar (CLEQM), Regional Centre for Shared Aquifer Resources Management (RCSARM), Regional Centre on Capacity Development and Research in Water Harvesting (RCWH)), UNESCO Chairs in the four countries (Chair on Water in Desert and Arid Zones, Chair in Water Resources, and Chair for Women in Sciences and Technology), the World Water Assessment Programme (WWAP), the IHP National Committees of the countries, and UNESCO's Offices in Cairo, Khartoum, and Yaoundé.

The project organisation structure is as follows:



The **Project Steering Committee (PSC)**.

National Governments' representatives on the PSC are responsible for making by consensus, management decisions when guidance is required by the Project Manager, including recommendation for UNDP/Implementing Partner approval of project plans and revisions. The Chair of the PSC will be agreed on a meeting-to-meeting basis and will rotate between the four NSAS countries. A PSC will be held at least annually.

The PSC will be comprised of the following individuals:

- National Government Representatives including:
 - Head of Chad Delegate of JA
 - Head of Egypt Delegate of JA
 - Head of Libya Delegate of JA
 - Head of Sudan Delegate of JA
- UNDP/GEF representative
- UNESCO-IHP representative
- IAEA representative

The **Project Manager** will run the project on a day-to-day basis on behalf of the Implementing Partner (UNESCO-IHP) within the constraints laid down by the PSC. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. **The Project Manager will secure to establish a close coordination with the Joint Authority national offices for the implementation of the project activities.** The Project Manager function will end when the final project terminal evaluation report and corresponding management response, and other documentation required by the GEF and UNDP, has been completed and submitted to UNDP (including operational closure of the project). **The Project Manager will be located at the Project Management Unit (PMU) and should be from another NSAS country than the host country.**

The Implementing Partner appoints the Project Manager, who should be different from the Implementing Partner's representative in the Project Board.

The **project assurance** roll will be provided by the IRH Senior Programme Coordinator. Additional quality assurance will be provided by the UNDP Regional Technical Advisor as needed.

Project Management Unit (PMU): an Operative Inception meeting will be organized at the beginning of the project implementation phase. Before the inception meeting, the implementing agency will send a request to countries to know which of them would like to host the PMU. The PMU should be hosted within one of the four Joint Authority national offices and countries should provide information about the facilities available in order to assure the functioning of the Unit. At the inception meeting, the countries and all project partners will discuss and contribute to the preparation of the detailed workplan of the activities of the project. It is foreseen that an international call will be launched to identify the most suitable expert to work as Project Manager at the PMU location. The Project Manager will act as the head of the PMU and should be from another NSAS country than the host country. The Project Manager will coordinate with national institutions and the joint authority taking care of their consideration in the day by day execution of the project.

National Teams:

Would include the JA four national offices and will be responsible for coordinating national activities throughout all components.

Technical Advisory Group:

Will be responsible for providing guidance to the Project PMU and PSC and should include international and regional experts from the NSAS countries.

The technical inputs required from the IAEA will be managed and delivered by the IAEA in coordination with the countries, subject to direct request from the four participating countries (Chad, Egypt, Libya and Sudan) to the Agency for the development of a TC project within the TC programme cycle 2020-2021.

Governance role for project target groups:

Key project stakeholders will be invited to participate in the technical advisory group. National pilot activities will be undertaken through local management arrangements involving local communities and government representatives. Where they exist and when it is needed, private sector representatives will be also invited to participate.

8 Financial Planning and Management

The total cost of the project is *USD 27,920,000*. This is financed through a GEF grant of *USD 3,990,000* and *USD 24,610,000* in parallel co-financing. UNDP, as the GEF Implementing Agency, is responsible for the execution of the GEF resources only.

Parallel co-financing: The actual realization of project co-financing will be monitored during the *mid-term review* and terminal evaluation process and will be reported to the GEF. The planned parallel co-financing will be used as follows:

Co-financing source	Co-financing type	Co-financing amount	Planned Activities/Outputs	Risks	Risk Mitigation Measures
Government of Chad	In-kind	2,000,000	Staff time, data, communications	Medium – Maintaining government interest on project	Ensuring project stays aligned with approved SAP
Government of Egypt	In-kind	5,000,000	Staff time, data, communications	Medium – Maintaining government interest on project	Ensuring project stays aligned with approved SAP
Government of Libya	In-kind	2,000,000	Staff time, data, communications	Medium – Maintaining government interest on project	Ensuring project stays aligned with approved SAP
Government of Sudan	In-kind	2,000,000	Staff time, data, communications	Medium – Maintaining government interest on project	Ensuring project stays aligned with approved SAP
UNDP	In-kind	300,000	Shared information	Low	GEF Agency
UNESCO-IHP	In-kind	4,000,000	Technical oversight of activities, technical assistance and training in groundwater governance and management, national and international institutional reforms and updates, pilot coordination, training materials	Low	Implementing Partner

IAEA	In-kind, via separate technical assistance project	To be determined, subject to availability of funds and approval by the IAEA Board of Governors	Isotope and modelling co-operation	Low	Partner
FAO	In-kind	1,750,000	Contribution to groundwater governance activities and trainings	Low	Partner
WWAP	In-kind	400,000	Sex-disaggregated data collection and assessment and gender-related trainings	Low	Partner
IGRAC	In-kind	200,000	Groundwater monitoring trainings	Low	Partner
AIDA	In-kind	30,000	Legal assistance and trainings	Low	Partner
Sant'Anna	In-kind	50,000	Groundwater modelling trainings	Low	Partner

Budget Revision and Tolerance: As per UNDP requirements outlined in the UNDP POPP, the PSC will agree on a budget tolerance level for each plan under the overall annual work plan allowing the project manager to expend up to the tolerance level beyond the approved project budget amount for the year without requiring a revision from the PSC. Should the following deviations occur, the Project Manager and Implementing Partner will seek the approval of the UNDP-GEF team as these are considered major amendments by the GEF: a) Budget re-allocations among components in the project with amounts involving 10% of the total project grant or more; b) Introduction of new budget items/or components that exceed 5% of original GEF allocation.

Any over expenditure incurred beyond the available GEF grant amount will be absorbed by non-GEF resources (e.g. UNDP TRAC or cash co-financing).

Refund to Donor: Should a refund of unspent funds to the GEF be necessary, this will be managed directly by the UNDP-GEF Unit in New York.

Project Closure: Project closure will be conducted as per UNDP requirements outlined in the UNDP POPP.¹⁵ On an exceptional basis only, a no-cost extension beyond the initial duration of the project will be sought from UNDP colleagues and then the UNDP-GEF Executive Coordinator.

¹⁵ see <https://info.undp.org/global/popp/ppm/Pages/Closing-a-Project.aspx>

Operational completion: The project will be operationally completed when the last UNDP-financed inputs have been provided and the related activities have been completed. This includes the final clearance of the Terminal Evaluation Report (that will be available in English) and the corresponding management response, and the end-of-project review Project Board meeting. The Implementing Partner through a Project Board decision will notify the UNDP RTA when operational closure has been completed. At this time, the relevant parties will have already agreed and confirmed in writing on the arrangements for the disposal of any equipment that is still the property of UNDP.

Financial completion: The project will be financially closed when the following conditions have been met: a) The project is operationally completed or has been cancelled; b) The Implementing Partner has reported all financial transactions to UNDP; c) UNDP has closed the accounts for the project; d) UNDP and the Implementing Partner have certified a final Combined Delivery Report (which serves as final budget revision).

The project will be financially completed within 12 months of operational closure or after the date of cancellation. Between operational and financial closure, the implementing partner will identify and settle all financial obligations and prepare a final expenditure report. The Implementing Partner will send the final signed closure documents including confirmation of final cumulative expenditure and unspent balance to the UNDP-GEF Unit for confirmation before the project will be financially closed in Atlas by UNDP.

9 TOTAL BUDGET AND WORK PLAN

Guidance to project developer: This table must be completed using a separate excel file and then be copied here. All sub-totals and totals must tally. All figures must be “numeric value”, not “text”.

CEO endorsement template: The TBWP table of the ProDoc needs to be align with Tables B and D

Total Budget and Work Plan			
Atlas ¹⁶ Proposal or Award ID:	00106577	Atlas Primary Output Project ID:	00107251
Atlas Proposal or Award Title:	Enabling implementation of the Regional SAP for the rational and equitable management of the Nubian Sandstone Aquifer System (NSAS)		
Atlas Business Unit	SVK10		
Atlas Primary Output Project Title	Enabling implementation of the Regional SAP for the rational and equitable management of the Nubian Sandstone Aquifer System (NSAS)		
UNDP-GEF PIMS No.	4736		
Implementing Partner	UNESCO-IHP		

GEF Component/Atlas Activity	Responsible Party/ ¹⁷ (Atlas Implementing Agent)	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
COMPONENT 1: Collaborative actions to further validate the functioning of the NSAS and its resources	UNESCO-IHP	62000	GEF	71200	International Consultants	55,000\$	55,000\$	40,000\$	0\$	150,000\$	A
				71300	Local Consultants	20,000\$	20,000\$	20,000\$	0\$	60,000\$	B
				72100	Contractual services	30,000\$	30,000\$	20,000\$	0\$	80,000\$	C
				71600	Travel	32,500\$	32,500\$	32,500\$	2,500\$	100,000\$	D
				75700	Trainings/workshops	40,000\$	40,000\$	15,000\$	0\$	95,000\$	E
				72200	Equipment and furniture	25,000\$	20,000\$	20,000\$	0\$	65,000\$	F

¹⁶ See separate guidance on how to enter the TBWP into Atlas

¹⁷ Only the responsible parties to be created as Atlas Implementing Agent as part of the COAs should be entered here. Sub-level responsible parties reporting directly to NIM Implementing Partners should not be entered here. For example, if under NIM, UNOPS signs LOA with the IP to manage component 2, and a department of Ministry X will manage component 3, this means that UNOPS will be listed as the responsible party under component 2. The rest of the components will list the IP as the responsible party.

GEF Component/Atlas Activity	Responsible Party/ ¹⁷ (Atlas Implementing Agent)	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
				72500	Office supplies	7,500\$	7,500\$	0\$	0\$	15,000\$	I
				72600	Grants	10,000	15,000	0\$	0\$	25,000	H
				74500	Miscellaneous expenses	2,500\$	2,500\$	2,500\$	2,500\$	10,000\$	G
					sub-total GEF	222,500\$	222,500\$	150,000\$	5,000\$	600,000\$	
COMPONENT 2: Strengthening capacity of national organisations and the Joint Authority, in-line with SAP, to manage the NSAS resources in a rational and equitable manner	UNESCO-IHP	62000	GEF	71200	International Consultants	70,000\$	85,000\$	70,000\$	35,000\$	260,000\$	A
				71300	Local Consultants	20,000\$	20,000\$	20,000\$	20,000\$	80,000\$	B
				72100	Contractual services	50,000\$	50,000\$	65,000\$	35,000\$	200,000\$	C
				71600	Travel	47,500\$	47,500\$	43,500\$	33,500\$	172,000\$	D
				72200	Equipment and furniture	20,000	20,000	0\$	0\$	40,000	F
				75700	Trainings/workshops	60,000\$	60,000\$	60,000\$	45,000\$	225,000\$	E
				72500	Office supplies	3,500\$	3,500\$	0\$	0\$	7,000\$	I
				74500	Miscellaneous expenses	4,000\$	4,000\$	4,000\$	4,000\$	16,000\$	G
	sub-total GEF	275,000\$	290,000\$	262,500\$	172,500\$	1,000,000\$					
COMPONENT 3: Enabling SAP implementation through legal, policy and institutional reforms at both national and regional levels	UNESCO-IHP	62000	GEF	71200	International Consultants	60,000\$	60,000\$	60,000\$	50,000\$	230,000\$	A
				71300	Local Consultants	45,000\$	45,000\$	45,000\$	30,000\$	165,000\$	B
				72100	Contractual services	20,000\$	20,000\$	25,000\$	25,000\$	90,000\$	C
				71600	Travel	42,500\$	42,350\$	40,450\$	40,000\$	165,300\$	D
				75700	Trainings/workshops	30,000\$	30,000\$	30,000\$	30,000\$	120,000\$	E
				74500	Miscellaneous expenses	5,000\$	5,150\$	7,050\$	12,500\$	29,700\$	G
					sub-total GEF	202,500\$	202,500\$	207,500\$	187,500\$	800,000\$	

GEF Component/Atlas Activity	Responsible Party/ ¹⁷ (Atlas Implementing Agent)	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
COMPONENT 4: Implementing targeted pilot projects to validate environmentally and socioeconomically rational and equitable management approaches within the NSAS	UNESCO-IHP	62000	GEF	71300	Local Consultants	30,000\$	25,000\$	25,000\$	10,000\$	90,000\$	B
				72100	Contractual services	25,000\$	25,000\$	25,000\$	10,000\$	85,000\$	C
				72600	Grants	75,000\$	75,000\$	75,000\$	0\$	225,000\$	H
				71600	Travel	20,000\$	20,000\$	20,000\$	9,000\$	69,000\$	D
				75700	Trainings/workshops	12,000\$	12,000\$	12,000\$	4,000\$	40,000\$	E
				72200	Equipment and furniture	196,000\$	206,000\$	89,000\$	0\$	491,000\$	F
					sub-total GEF	358,000\$	363,000\$	246,000\$	33,000\$	1,000,000\$	
COMPONENT 5: Pre-feasibility studies to identify NSAS investment opportunities	UNESCO-IHP	62000	GEF	71200	International Consultants	40,000\$	40,000\$	20,000\$	20,000\$	120,000\$	A
				71300	Local Consultants	10,000\$	10,000\$	10,000\$	10,000\$	40,000\$	B
				72100	Contractual services	20,000\$	20,000\$	10,000\$	20,000\$	70,000\$	C
				71600	Travel	10,000\$	10,000\$	15,000\$	15,000\$	50,000\$	D
				75700	Trainings/workshops	20,000\$	20,000\$	20,000\$	20,000\$	80,000\$	E
				72500	Office supplies	5,000\$	5,000\$	5,000\$	5,000\$	20,000\$	I
				74500	Miscellaneous expenses	5,000\$	5,000\$	5,000\$	5,000\$	20,000\$	G
					sub-total GEF	110,000\$	110,000\$	85,000\$	95,000\$	400,000\$	
Project management unit	UNESCO-IHP	62000	GEF	71200	International Consultants	15,000\$	15,000\$	15,000\$	15,000\$	60,000\$	A
				71300	Local Consultants	30,000\$	30,000\$	30,000\$	20,000\$	110,000\$	B
				71600	Travel	4,000\$	5,000\$	5,000\$	4,000\$	18,000\$	D
				72500	Office supplies	2,000\$	\$	\$	\$	2,000\$	I
					sub-total	51,000\$	50,000\$	50,000\$	39,000\$	190,000\$	

GEF Component/Atlas Activity	Responsible Party/ ¹⁷ (Atlas Implementing Agent)	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
PROJECT TOTAL						1,219,000\$	1,238,000\$	1,001,000\$	532,000\$	3,990,000\$	

Summary of Funds:¹⁸

	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Total
GEF	1,219,000\$	1,238,000\$	1,001,000\$	532,000\$	3,990,000\$
Government of Chad	500,000\$	500,000\$	500,000\$	500,000\$	2,000,000\$
Government of Egypt	1,250,000\$	1,250,000\$	1,250,000\$	1,250,000\$	5,000,000\$
Government of Libya	500,000\$	500,000\$	500,000\$	500,000\$	2,000,000\$
Government of Sudan	500,000\$	500,000\$	500,000\$	500,000\$	2,000,000\$
UNDP	75,000\$	75,000\$	75,000\$	75,000\$	300,000\$
UNESCO-IHP	1,000,000\$	1,000,000\$	1,000,000\$	1,000,000\$	4,000,000\$

¹⁸ Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc...

	To be determined, subject to availability of funds and approval by the IAEA Board of Governors	To be determined, subject to availability of funds and approval by the IAEA Board of Governors	To be determined, subject to availability of funds and approval by the IAEA Board of Governors	To be determined, subject to availability of funds and approval by the IAEA Board of Governors	To be determined, subject to availability of funds and approval by the IAEA Board of Governors
IAEA					
FAO	437,500\$	437,500\$	437,500\$	437,500\$	1,750,000\$
WWAP	100,000\$	100,000\$	100,000\$	100,000\$	400,000\$
IGRAC	80,000\$	80,000\$	40,000\$	\$	200,000\$
AIDA	5,000\$	10,000\$	10,000\$	5,000\$	30,000\$
Scuola Superiore S. Anna (Sant'Anna School of Advanced Studies)	20,000\$	20,000\$	10,000\$	\$	50,000\$
TOTAL	5,686,500\$	5,710,500\$	5,423,500\$	4,899,500\$	21,720,000\$

Budget notes:

A: International Consultants: This includes regional and international consultants working on project activities, Midterm review and Terminal evaluation (MTR/TE) consultants including PMU staff

B: Local Consultants: Including experts working on project activities and PMU staff working on technical and management activities.

C: Contractual services - organizations: Legal entities (national/international) implementing activities, e.g. training, capacity and field studies including equipment procurement according to approved ToRs

D: Travel: Travel by consultants, beneficiaries and PMU staff on component related activities.

E: Trainings/workshops: Training facilities required for workshops related to component activities

F: Equipment and furniture: Specific groundwater analytical and monitoring (field and laboratory) equipment essential to the implementation of the pilot activities to be purchased under UN procurement rules

G: Miscellaneous expenses: Project management contingencies material, publication of documents, communication material, website

H: Grants: Contracts with selected national organizations to implement field studies within the pilot projects areas including equipment procurement according to approved ToRs

I: Office supplies: PCs, printers and consumables including laboratory consumables (e.g. software, scanners, GPS, data loggers) required to implement the project

10 LEGAL CONTEXT

This project forms part of an overall programmatic framework under which several separate associated country level activities will be implemented. When assistance and support services are provided from this Project to the associated country level activities, this document shall be the “Project Document” instrument referred to in: (i) the respective signed SBAAAs for the specific countries; or (ii) in the [Supplemental Provisions](#) attached to the Project Document in cases where the recipient country has not signed an SBAA with UNDP, attached hereto and forming an integral part hereof.

This project will be executed by the UNESCO-IHP (“Implementing Partner”) in accordance with its financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

The responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP’s property in the Implementing Partner’s custody, rests with the Implementing Partner. The Implementing Partner shall: (a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried; (b) assume all risks and liabilities related to the Implementing Partner’s security, and the full implementation of the security plan. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The Implementing Partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

Any designations on maps or other references employed in this project document do not imply the expression of any opinion whatsoever on the part of UNDP concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

11 Risk Management

UNESCO-IHP as the Implementing Partner will comply with the policies, procedures and practices of the United Nations Security Management System (UNSMS.)

UNESCO-IHP as the Implementing Partner will ensure that the following obligations are binding on each responsible party, subcontractor and sub-recipient that is not a UN entity:

- a. Consistent with the Article III of the SBAA [*or the Supplemental Provisions to the Project Document*], the responsibility for the safety and security of each responsible party, subcontractor and sub-recipient and its personnel and property, and of UNESCO-IHP's property in such responsible party's, subcontractor's and sub-recipient's custody, rests with such responsible party, subcontractor and sub-recipient. To this end, each responsible party, subcontractor and sub-recipient shall:
 - i. put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
 - ii. assume all risks and liabilities related to such responsible party's, subcontractor's and sub-recipient's security, and the full implementation of the security plan.
- b. UNESCO-IHP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the responsible party's, subcontractor's and sub-recipient's obligations under this Project Document.

UNESCO-IHP agrees to undertake all reasonable efforts to ensure that none of the [project funds]¹⁹ [UNDP funds received pursuant to the Project Document]²⁰ are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml.

Social and environmental sustainability will be enhanced through application of the UNDP Social and Environmental Standards (<http://www.undp.org/ses>) and related Accountability Mechanism (<http://www.undp.org/secu-srm>).

The Implementing Partner shall: (a) conduct project and programme-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project or programme to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.

All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any programme or project-related commitments or compliance with the UNDP Social and Environmental

¹⁹ To be used where UNDP is the Implementing Partner

²⁰ To be used where the UN, a UN fund/programme or a specialized agency is the Implementing Partner

Standards. This includes providing access to project sites, relevant personnel, information, and documentation.

The Implementing Partner will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, responsible parties, subcontractors and sub-recipients in implementing the project or programme or using the UNDP funds. The Implementing Partner will ensure that its financial management, anti-corruption and anti-fraud policies are in place and enforced for all funding received from or through UNDP.

The Implementing Partner and UNDP will promptly inform one another in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

Where the Implementing Partner becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, the Implementing Partner will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). The Implementing Partner shall provide regular updates to the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

UNDP shall be entitled to a refund from the Implementing Partner of any funds provided that have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document. Such amount may be deducted by UNDP from any payment due to the Implementing Partner under this or any other agreement.

Where such funds have not been refunded to UNDP, the Implementing Partner agrees that donors to UNDP (including the Government) whose funding is the source, in whole or in part, of the funds for the activities under this Project Document, may seek recourse to the Implementing Partner for the recovery of any funds determined by UNDP to have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of the Project Document.

Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors and sub-recipients.

Each contract issued by the Implementing Partner in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or in contract execution, and that the recipient of funds from the Implementing Partner shall cooperate with any and all investigations and post-payment audits.

Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.

The Implementing Partner shall ensure that all of its obligations set forth under this section entitled "Risk Management Standard Clauses" are passed on to each responsible party, subcontractor and sub-recipient and that all the clauses under this section entitled "Risk Management" are included, *mutatis mutandis*, in all sub-contracts or sub-agreements entered into further to this Project Document.

12 MANDATORY ANNEXES

Annex A:	UNDP Risk log
Annex B:	Multi-year work plan
Annex C:	Monitoring Plan
Annex D:	Evaluation Plan
Annex E:	UNDP SESP
Annex F:	Gender Marker
Annex G:	GEF Tracking Tool (Excel file)
Annex H:	Pilot selection template with criteria
Annex I:	Terms of Reference for PMU
Annex J:	Co-financing letters