スーダン国
水供給人材育成プロジェクト・フェーズ2

終了時評価調査報告書

平成27年3月
(2015年)

独立行政法人国際協力機構
地球環境部

環境
JR
15-097

スーダン国
水供給人材育成プロジェクト・フェーズ 2

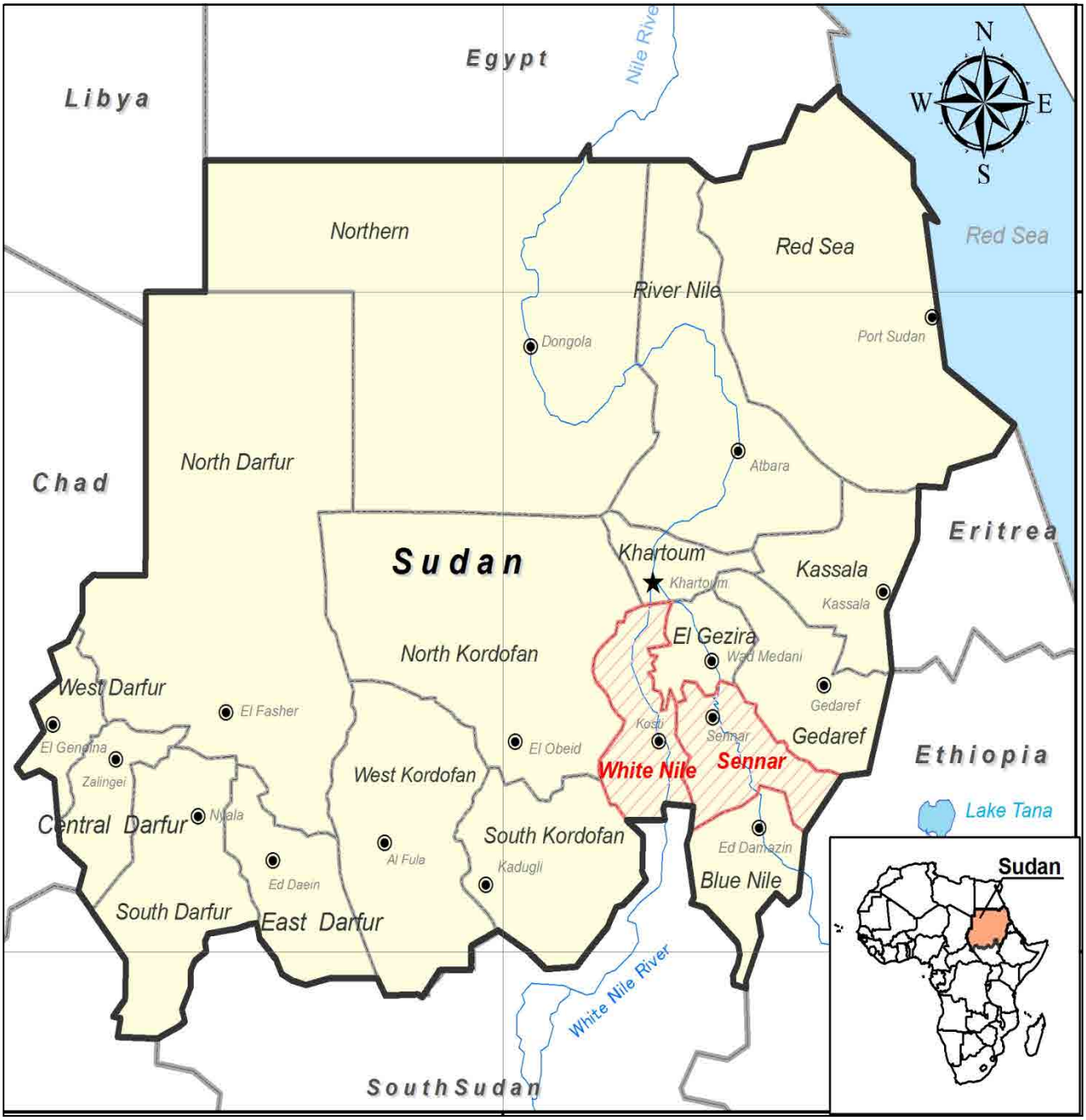
終了時評価調査報告書

平成 27 年 3 月
(2015 年)

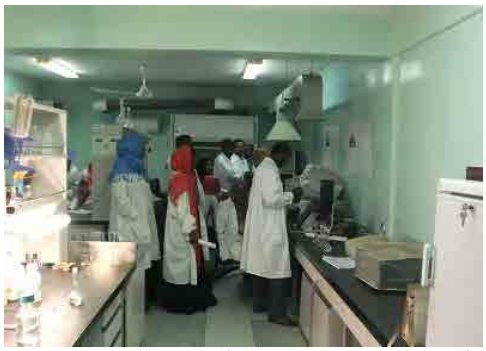
独立行政法人国際協力機構
地球環境部

目　　次

位　置　図

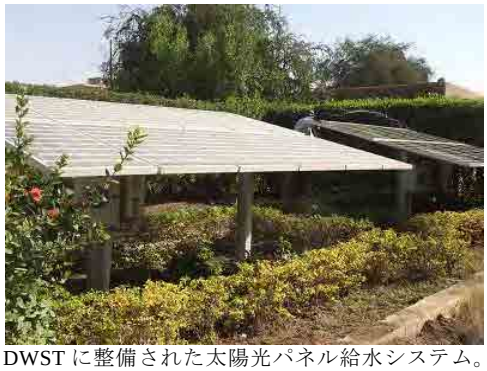

Libya
Egypt
Nile River
N
W
E
S
Red Sea
Red Sea
Northern
River Nile
Dongola
Port Sudan
Chad
North Darfur
Atbara
Eritrea
Sudan
Khartoum
Khartoum
Kassala
Kassala
El Gezira
Wad Medani
North Kordofan
West Darfur
El Fasher
Gedaref
Kosti
Sennar
Gedaref
El Geneina
El Obeid
Ethiopia
White Nile
Sennar
Zalingei
West Kordofan
Lake Tana
Central Darfur
Nyala
South Kordofan
Ed Damazin
Al Fula
Kadugli
Blue Nile
Ed Daein
South Darfur
East Darfur
White Nile River
South Sudan
Sudan

写　　真

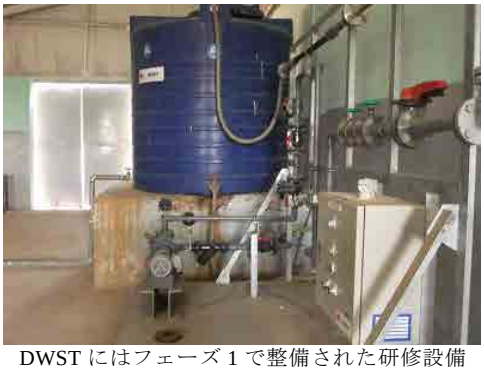


DWST での水質検査研修の様子。日本仕様のラボラトリー設備機材が整っている。

DWST ワークショップにて実施されている給水施設研修。全国の SWC のエンジニアが参加している。

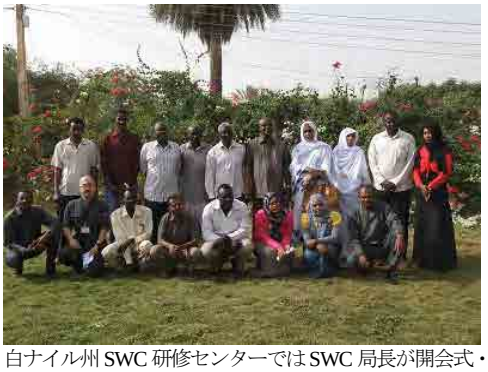


DWST に整備された太陽光パネル給水システム。先端技術の給水関連研修が受けられる。



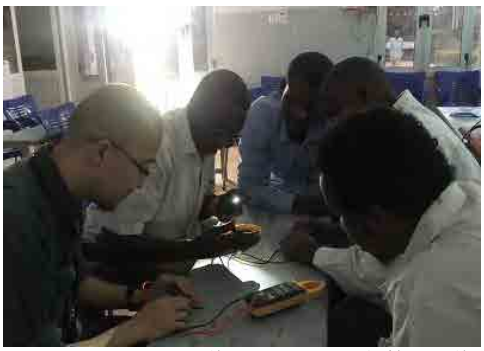
DWST にはフェーズ 1 で整備された研修設備機材が職員たちにより維持管理されている。

DWSU にはインフォメーションセンター兼モニタリング評価部が設置されており、WES インフォメーションシステムで全国の情報を管理する役割を担っている。



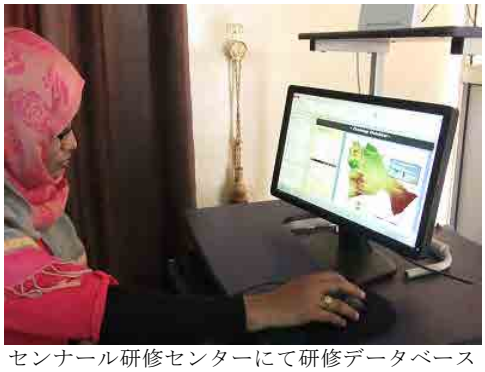
白ナイル州 SWC 研修センターでは SWC 局長が開会式・閉会式に参加し、SWC ローカリティからの参加者に技術と知識の向上を呼び掛けている。

白ナイル州 Tendalty ローカリティのウォーターヤード。モニタリング評価ユニットがモニタリング調査を実施し、改修工事を行うこととなった。

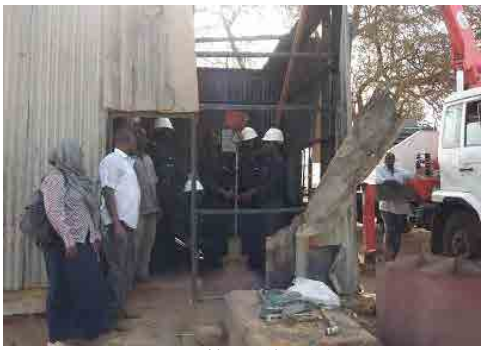


白ナイル州 SWC 研修センター、電気管理研修に JICA 専門家の指導を熱心に聞く研修生たち。

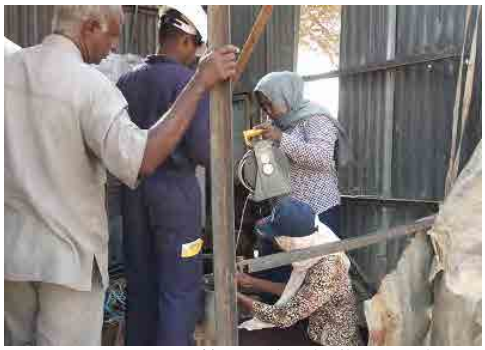
センナール州 SWC 研修センターの設置と運営管理を担うセンター長と研修スーパーバイザー。



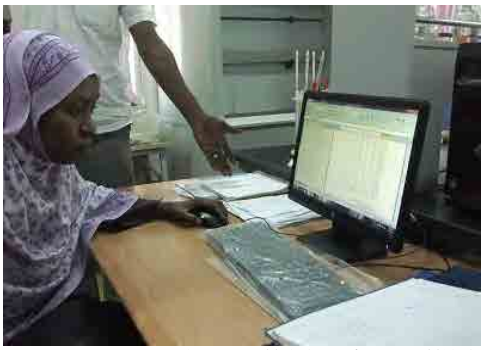
センナール研修センターにて研修データベースをタイムリーに管理している職員。



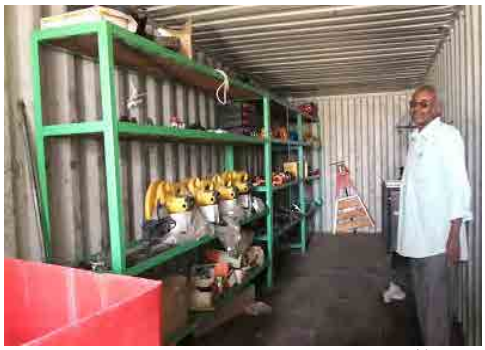
センナール州にて井戸管理研修に参加する SWC 職員。機材供与される前は、井戸改修は外部業者に委託、または、井戸水に問題があると井戸を閉鎖するという対応をしていた。



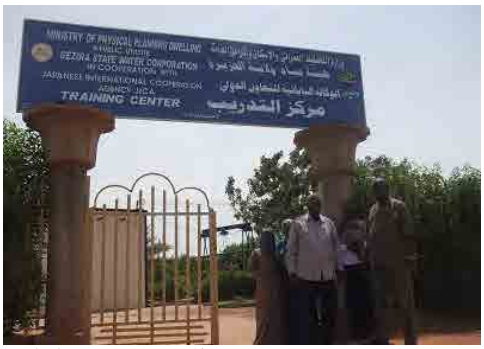
センナール州井戸管理研修を指導する講師と研修コーディネーター。エアーリフティング前に研修生とともに水位を計測。



センナール州 Singa 浄水場水質検査ラボでは水質検査研修に参加した SWC 職員が検査結果記録をデータベースにて管理し、報告書フォーマットを導入した。

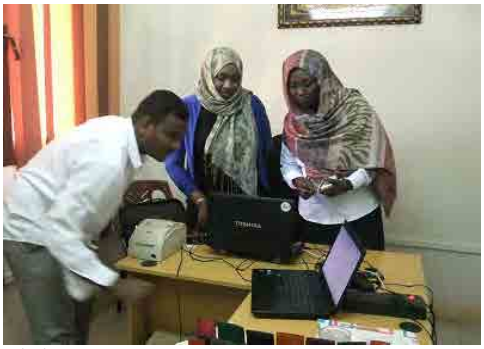


センナール州ワークショップにて供与機材を管理し、研修で使用するとともに、セクター/ローカリティ事務所に貸し出しをしている。

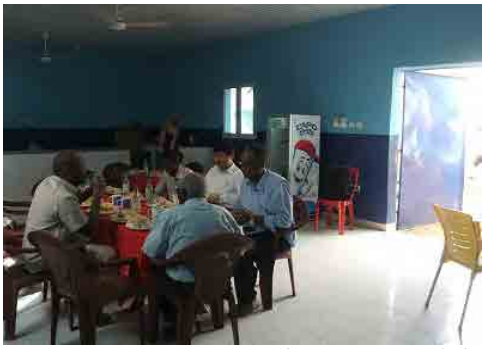


ゲジラ州 SWC 研修センターではフェーズ 1 から DWST で様々な研修に参加した女性のセンター長が活躍している。

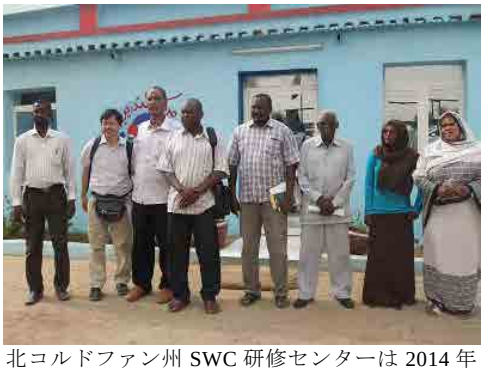
ゲジラ州研修センターのコンピュータラボ。徹底した PC 機器管理がなされている。



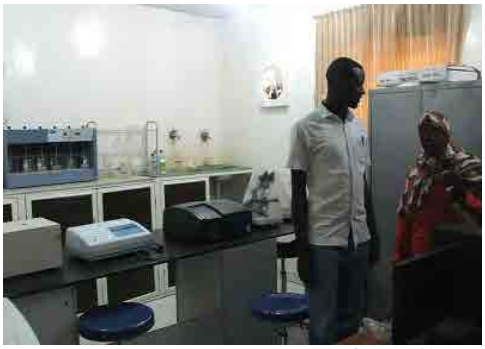
ゲジラ州では顧客台帳、ウォーターヤードの維持管理情報などのデータベースを開発し、州都のローカリティに導入し、研修センターで使用方法を指導している。



北コルドファン州 SWC 研修センターには食堂も整備されている。

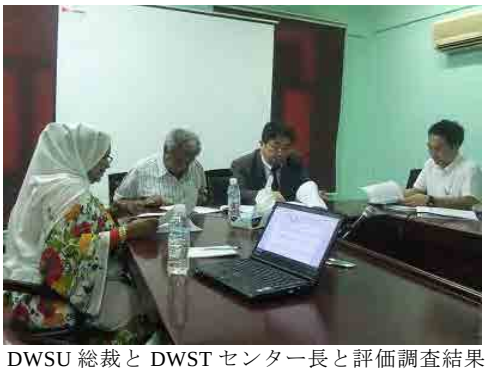


北コルドファン州 SWC 研修センターは 2014 年 4 月に州政府により開設。既に 25 コースを通じ 516 名が研修に参加。JICA により機材が供与され州内では JICA センターと呼ばれる。

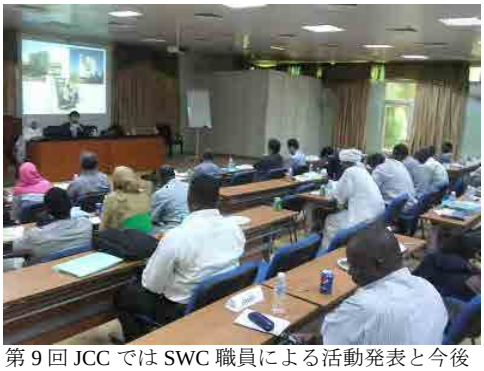


北コルドファン州オベイド浄水場内の水質検査ラボ。研修場所としても使用している。DWST で研修を受けた SWC が勤務しており、研修コーディネーターも務める。

MoWRE Dam Implementation Unit の GIS センターでは Water Atlas プロジェクト（給水施設の情報収集）を実施している。



DWSU 総裁と DWST センター長と評価調査結果の協議をおこなう調査団。



第 9 回 JCC では SWC 職員による活動発表と今後の取組みについて協議された。

M/M 署名を行う DWSU 総裁と調査団長。

略　語　表

略語	英語	日本語
ABHSMD	The Hydraulic Agency of Souss-Massa-Draa-Basin in Morocco	モロッコ国スース・マッサー・ダラー流域水利公社
AfDB	African Development Bank	アフリカ開発銀行
C/P	Counterpart Personnel	実施機関
DG	Director General	総裁
DWSU	Drinking Water and Sanitation Unit	飲料水・衛生局
DWST	Drinking Water and Sanitation Unit Training Center	飲料水・衛生局研修センター
IOM	International Organization for Migration	国際移住機関
IPRSP	Interim Poverty Reduction Strategy Paper	暫定貧困削減戦略文書
JCC	Joint Coordination Committee	合同調整委員会
JICA	Japan International Cooperation Agency	国際協力機構
JPY	Japanese Yen	日本円
M/M	Minutes of Meetings	協議議事録
MoH	(Federal) Ministry of Health	連邦政府保健省
MoHRD	(Federal) Ministry of Human Resource Development	連邦政府人材育成省
MoWRE	Federal Ministry of Water Resources and Electricity	連邦政府水資源・電力省
ODA	Official Development Assistance	政府開発援助
OJT	On the Job Training	オンザジョブ・トレーニング
O&M	Operation and Maintenance	運転・維持管理
ONEE	National Drinking Water and Electricity Corporation in Morocco	モロッコ国営電力・水道公社
ONEP	National Water Corporation in Morocco	モロッコ国営水道公社
PDM	Project Design Matrix	プロジェクト・デザイン・マトリックス
PO	Plan of Operations	詳細活動計画
PSWC	Pilot State Water Corporation	パイロット州水公社
R/D	Record of Discussions	討議議事録
SDG	Sudan Pond	スーダンポンド
SWC	State Water Corporation	州水公社
ToT	Training of Trainers	指導員訓練
UNICEF	United Nations Children's Fund	国際連合児童基金
UNOPS	United Nations Office for Project Services	国際連合プロジェクトサービス機関
WASH	Water, Sanitation and Hygiene	水・衛生セクター
WB	World Bank	世界銀行
WES	Water, Environment and Sanitation	スーダン政府による水と環境衛生プロジェクト（UNICEF 技術支援）
WHO	World Health Organization	世界保健機関

終了時評価調査結果要約表

1．案件の概要		
国名：スーダン共和国		案件名：水供給人材育成プロジェクト・フェーズ 2
分野：水資源開発		援助形態：技術協力プロジェクト
所轄部署：地球環境部		協力金額（評価時点）：約 6.1 億円
協力期間	（R/D: 2011 年 8 月 14 日） 2011 年 11 月 1 日～ 2015 年 9 月 30（4 年間）	先方関係機関： 水資源・電力省　飲料水衛生局（DWSU） 飲料水衛生局研修センター（DWST）、州水公社（SWC）
		日本側協力機関：株式会社地球システム科学

他の関連協力

【JICA】

・ 技術協力プロジェクト「カッサラ州基本行政サービス向上による復興支援プロジェクト」（2011-2014 年）
・ 技術協力プロジェクト「ダルフール及び暫定統治三地域プロジェクト」（2009-2013 年）
・ 技術協力プロジェクト「フロントライン母子保健強化プロジェクト・フェーズ 2」（2011-2014 年）

【国際連合児童基金：UNICEF】

・ 「水・環境・衛生（Water, Environment and Sanitation：WES）プロジェクト」（1996 年-）

【国際連合プロジェクトサービス機関：UNOPS】

・ 「ダルフール都市給水プロジェクト」（2010-2014 年)

【国際移住機関：IOM】

・ 南コルドファンにて給水関連プロジェクト

1-1　協力の背景と概要

スーダンの安全な水へのアクセス率は 1990 年に 67.6 パーセント[1]を記録したものの、国内の混乱により、その後 65 パーセント[2]（2010 年）と停滞している。スーダン政府は給水施設の整備に努力を重ね、国家 25 ヵ年給水計画（2007-2031 年）では、2031 年までに同アクセス率を 100 パーセントにすることを目指している[3]。

給水事業にかかる責任・権限は従来、国営水公社〔現在は水資源・電力省飲料水衛生局（Drinking Water and Sanitation Unit：DWSU）に組織改編〕が有していたが、地方分権化政策により各州の水公社に委譲され、国営水公社の役割は給水政策の策定、州をまたぐ大規模給水施設建設等に限定されることとなった。一方、各州水公社では人材開発がほとんど行われておらず、責任や権限が委譲されたにもかかわらず、給水施設の整備や維持管理に支障をきたす状態であった。そこで JICA は 2008 年 6 月から 2011 年 3 月まで「水供給人材育成計画プロジェクト」（以下、フェーズ 1）を実施し、各州水公社で中核となる技術者を育成するために国営水公社が設置した国営水公社研修センター〔現在は飲料水衛生局研修センター（Drinking Water and Sanitation Unit Training Center：DWST）に組織改編〕の立ち上げと機能の強化を支援した。フェーズ 1 を通して DWST の研修実施能力は強化されたものの、給水分野の更なる人材育成のためには、実務担当者を抱える各州水公社の研修実施能力向上の必要性があった。

このような背景に基づき、スーダン政府からの要請を受けて JICA は 2011 年 11 月から 2015 年 9 月までの予定で「水供給人材育成プロジェクト・フェーズ 2」（以下、本プロジェクト）を

[1] 出所：WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (http://www.wssinfo.org/)

[2] 出所：JICA 専門家作成資料（出所：2008 年統計調査、state statistic offices）。2010 年時点の 14 州の平均値（青ナイル州、ゲダレフ州、北コルドファン州、北部州、紅海州、リバーナイル州、センナール州、南コルドファン州、白ナイル州、ゲジラ州、カッサラ州、北ダルフール州、南ダルフール州、西ダルフール州）。都市部平均値 91.1%、地方部平均値 56.8%である。
出所：“Quarter Century Strategy for Water Supply First phase programme 2007-2011”, “National Water Corporation, Ministry of Irrigation and Water Resources (2007)”
JICA 専門家作成資料（出所：2010 年 SWC と WES projects データ）によると、2010 年時点の給水量は 1 日 1 人当たり 24.0 リットル（L/人/日）、地方部では 18.7（L/人/日）、都市部では 42.1（L/人/日）。

実施している。本プロジェクトでは、パイロット地域である白ナイル州とセンナール州の水公社の人材育成と DWST の更なる能力強化を目指し、総括/研修計画/給水計画、副総括/組織管理/水道料金管理、井戸管理、給水施設管理（浄水場/管網管理）、データ管理/モニタリングなどの分野で 10 名の専門家を派遣して活動を進めている。

1-2　協力内容

（1） 上位目標

スーダンにおいて給水施設が適切に維持管理されるようになる。

（2） プロジェクト目標

スーダンにおいて給水人材が適切に育成される。

（3） 成果

1） DWST で中長期人材育成計画に則った研修が実施される。
2） DWST による支援の下、パイロット州水公社（Pilot State Water Corporation：PSWC）における研修実施体制が確立される。
3） PSWC の研修実施と給水施設維持管理のモニタリング体制が DWSU 及び PSWC に確立される。
4） DWST による支援の下、その他水公社（State Water Corporation：SWC）における研修実施体制が整備される。

（4）投入（評価時点－2015 年 3 月時点における終了時時点の見込み）

日本側：

短期専門家派遣：	10 名（108.74 人月（MM））
研修員受入：	46 名（モロッコ第三国研修 内 10 名は予定）
機材供与：	2 億 4,524 万 9,213 円
ローカルコスト負担：	6,260 万 7,000 円

スーダン側

カウンターパート：	DWSU、DWST（16 名）、パイロット州水公社（PSWC：白ナイル州水公社 28 名、センナール州水公社 24 名）計 68 名
施設提供：	プロジェクト事務所（DWST、白ナイル SWC、センナール SWC） 事務家具、通信ネットワーク、電気等 研修施設・スペース
ローカルコスト負担：	DWST：計 2 億 2,322 万 6,829 円相当[4]（1,128 万 3,200SDG） センナール州 SWC：計 3,619 万 7,222 円相当[5]（182 万 9,621SDG） 白ナイル州 SWC：計 3,190 万 6,943 円相当[6]（161 万 2,765SDG）

2． 評価調査団の概要

調査者	総括　　：江尻　幸彦　　JICA 地球環境部　水資源・防災グループ 評価企画：清水　浩二　　JICA 地球環境部　水資源第二チーム 評価分析：小野里　宏代　グローバルリンクマネージメント（株）	
調査期間	2015 年 2 月 22 日～2015 年 3 月 12 日	**評価種類**：終了時評価

3.評価結果の概要

3-1　実績の確認

（1） 成果の達成状況

【成果 1：DWST で中長期人材育成計画に則った研修が実施される。】

[4] 2011 年度～2015 年度 DWST 予算の総額。換算レート 19.784 円/SDG（2015 年 2 月 JICA 公式レート）。
[5] 2012 年度～2015 年度センナール州 SWC 予算の総額。換算レートは同上。
[6] 2012 年度～2015 年度白ナイル州 SWC 予算の総額。換算レートは同上。

成果 1 の指標は概ね達成されている。2012 年 6 月までに「中長期人材育成計画（2012-2026 年)」の骨子が策定され、DWST は同計画に基づく年間研修計画を策定してきた（指標 1-1)。中間レビュー時までに、DWST の研修実施コーディネーターの研修計画立案と実施における貢献度は全体の 100%になったことが確認された（指標 1-2)。DWST では年間 20 コース以上の研修が実施されている（指標 1-3)。従って、DWST において中長期人材育成計画に則った研修が実施されていると判断される。

【成果 2：DWST による支援の下、PSWC における研修実施体制が確立される。】
成果 2 の指標は全て達成されている。PSWCs では 2012 年の研修センター開設後、2013 年末までに研修実施コーディネーターの研修計画立案と実施における貢献度（年間平均）は目標値（80%以上）を達成した（指標 2-1)。各 PSWC では年間研修計画に基づいた研修が実施されており、プロジェクト期間終了後の研修計画を含む、人材育成アクションプラン（2016-2018 年）も策定された（指標 2-2)。従って、PSWC における研修実施体制が確立されたと判断される。

【成果 3：PSWC の研修実施と給水施設維持管理のモニタリング体制が確立される。】
成果 3 は概ね達成されている。2015 年 3 月までにモニタリングマニュアルが作成され、合同調整委員会（Joint Coordination Committee：JCC）会議にて、各州 SWC 及び給水分野の支援事業を実施する国際機関関係者に配布された（指標 3-1)。2014 年 1 月の中間レビュー後、DWSU と PSWCs にモニタリング評価部/ユニットが設置され、研修及び給水施設維持管理の各モニタリング計画・調査項目/様式が策定された。研修実施のモニタリング結果は各 PSWC で管理され、DWST へ定期的に送付されている。
他方、給水施設維持管理のモニタリングについては、モデルサイトにおけるベースライン調査が計画通りに実施されている。また、PSWC でのデータ管理と DWSU へのデータ及び分析結果の共有も適宜なされている。加えて、モデルサイトでの分析結果を踏まえ、優先度の高い施設設備の改修計画が策定された。各州内の残りの郡については、センナール州では 2015 年 12 月、白ナイル州では 2016 年 1 月中に全郡のウォーターヤードのベースライン調査が完了予定である（指標 3-2)。
従って、PSWC の研修実施のモニタリング体制は確立され、給水施設維持管理のモニタリングについては郡ごとに順次開始されており、その体制は整備されつつあると判断される。

【成果 4：DWST による支援の下、その他 SWC における研修実施体制が整備される。】
成果 4 は概ね達成されている。DWST では人材育成マニュアル（案）が作成され、本調査時点で最終化作業中であった。同マニュアルの完成後、全 SWC へ配布予定である（指標 4-1)。本プロジェクト開始以前は DWST 以外の研修センターは設置されておらず、州レベルで研修センターを所有する SWC はなかった。本プロジェクトにより、州レベルでの人材育成の重要性の認識と優先度が高まり、現在では 18 州中、14 州において研修センターが設置された。合同セミナーはこれら州レベルで新規に設置された研修センターが主催しており、PSWCs 及び他 SWC の活動成果が共有された。2014 年 11 月までに目標開催数の 6 回は達成されている（指標 4-2)。
従って、SWC における研修実施体制は各州によって進捗は異なるものの、DWST 及び PSWC による支援の下、整備されつつあると判断される。

（2） プロジェクト目標の達成状況
【プロジェクト目標：スーダンにおいて給水人材が適切に育成される。】
プロジェクト目標の指標は達成されている。DWST 及び各州水公社において実施された研修への参加者数は、延べ 3,196 名に上る（2015 年 3 月時点）（指標 1)。各 PSWC において維持管理されたウォーターヤードの数は年間目標値（20 カ所）を超えている。4 年次では（2014 年 10 月以降 2015 年 2 月時点)、センナール州で 32 カ所（57 アイテム)、白ナイル州で 48 カ所（85 アイテム）の維持管理、改修が実施された（指標 2)。
従って、スーダンにおいて給水人材が適切に育成されていると判断される。

３-２　評価結果の要約

３-２-１　妥当性：高い

本プロジェクトはスーダン政府の開発政策及び日本の対スーダン援助政策、技術の優位性との整合性が高い。本プロジェクトのパイロット州として選択された 2 州では、JICA の他の技術協力プロジェクト及びスキームによる支援が実施されており、本プロジェクトによる相乗効果が発現し、隣接する両州の社会開発のニーズに合致している。

３-２-２　有効性：高い

プロジェクト目標の 2 つの指標は既に達成されており、4 つの成果によってもたらされたと判断される。また、プロジェクト目標を達成する上での貢献要因として、モロッコとの技術交流、及び他プロジェクトとの連携を通じた異なる州 SWC 職員間の技術交流等が確認された。このほか、治安情勢の問題がある地域の SWCs への技術移転は、当該地域の SWC 職員に対して、DWST 及び PSWC 研修センターにおける通常及び特別コース、モロッコ第三国研修等の機会を提供することで技能強化を行った。

３-２-３　効率性：やや高い

全ての成果はほぼ達成している。成果達成への貢献要因としてはフェーズ 1 で育成された人材の活用、各種技術コースのオンザジョブ・トレーニング（On the Job Training：OJT）、DWST 及び SWC 間の連携、給水分野の事業を実施する国際機関との連携が挙げられる。スーダン側の投入として想定されていた新規キロテン研修センターの建設が遅れ、DWST 研修活動の当初計画への影響が危惧されたものの、DWST は研修予算を継続的に確保し、既存の施設・機材を活用し、毎年、コースの種類及び実施回数を増やすことで、より多くの参加者に研修を提供してきた。給水施設維持管理のモニタリング活動に関し、DWSU 及び PSWCs によるモニタリング評価部/ユニットの設置が中間レビュー後まで先延ばしされたことにより、成果 3 の効率性に負の影響を与えた。

３-２-４　インパクト：中程度

プロジェクト期間終了から3年から5年後に上位目標が達成されるのは難しいと考えられる。スーダンにおいて給水施設が適切に維持管理されるようになるためには､プロジェクト目標（給水人材育成）が維持された上に外部条件（財政面、組織面、施設及び機材の整備、治安情勢などの政治・社会面）が満たされる必要がある。加えて、モニタリングシステムが全州で導入され、全国の既存の給水施設の維持管理情報を把握することが前提となる。このように、複数の外部条件に影響を受ける上、給水システムのマネージメントを向上するために要する年数を考慮すると、上位目標の設定に課題があり、インパクトを判断する上でマイナスの要因となった。

他方、上位目標の指標として設定されている「SWC スタッフが彼らの知識や技術を活用し、給水施設の運営維持管理を行う」については、パイロット州を含むいくつかの SWC において、一定程度実行可能であると見込まれる。既に DWST 及び PWSC 研修センターのコースに参加した SWC 職員が、習得技術と知識を給水施設の運転・維持管理に活用している好事例が確認されている。従って、必要な投入がなされれば、研修を受けた SWC 職員を施設維持管理の実務へ活用する組織的な取り組みが可能となるであろう。

このほか、波及効果として、DWST の評判が上がり国際機関及び国内の給水関連機関等、他機関からの研修依頼が寄せられるようになったこと、そして、14 州において研修センターが自助努力で開設したことは特筆に値する。

３-２-５　持続性：やや高い

（１） 政策面：政策面の持続性は高い。

スーダン側の政策において給水分野の人材育成の重要性が強調されており、DWST及びPSWCsでは人材育成、研修及び給水施設（ウォーターヤード）のモニタリング、改修に関する、各アクションプランが策定されている。今後、これらの計画が着実に実行されれば、給水人材が適切に育成される上に、パイロット州の給水施設の適切な維持管理が促進されると

期待される。

（２） 組織面：組織面の持続性は高い。
人材育成に関し、DWSTの研修実施体制は確立されており、「中長期人材育成計画（2012-2026年）」が継続的に実施されることで、プロジェクト効果の継続が期待される。PSWCsでは人材育成に係るアクションプラン（2016-2018年）を実施する上で十分な要員が配置されており、研修活動の継続と拡大への強い意志が表明されていることから、組織面の持続性にプラスの要素となっている。PSWCによる給水施設の運転・維持管理に関しては、研修を受けた職員及び供与機材を最大限に活用することで、現場の作業の質も向上することが期待できる。給水施設維持管理のモニタリングに関しては、DWSU及びPSWCsは継続的なモニタリングの重要性を認識し、その実施体制も明確化されている。

（３） 財政面：財政面の持続性はやや高い。
人材育成に関し、DWSTは連邦政府に、PSWCsは州政府及び水道料金収入にその財源を依存しているものの、プロジェクト期間を通し、継続的に研修予算を確保してきた。更に、PSWCsはプロジェクト終了後3年間のアクションプランを策定していることから持続性が担保されている。他方、給水施設の運転・維持管理費用に関しては、SWCは限られた水道料金収入から捻出していることから、如何にコスト削減を図るかという共通課題が残されている。また、郡事務所職員及び施設のオペレーターによるモニタリング活動費用も水道料金収入から捻出している。しかし、PSWCsがモニタリング評価ユニットメンバーを動員し、広く拡散した村々にある全ての施設を定期的に監視していくには車両や水質検査機材等が不足している状況であることから、持続性にマイナスの要素となっている。

（４） 技術面：技術面の持続性はやや高い。
人材育成に関し、DWSTはスーダンにおける給水人材育成の中心的役割を担ってきた。また、PSWC研修センターにおいても、本プロジェクトで開発されたマニュアルや手法、供与機材を活用し、研修運営管理を継続していく自信が表明されている。給水施設の運転・維持管理に関し、DWSTは先端技術の研修を率先して実施している。他方、パイロット州における給水施設のモニタリングに関しては、研修効果を給水施設の維持管理の質の向上に繋げ、効果の拡大を図るためにも、モニタリング活動の継続的な技術支援の必要性が実施機関（Counterpart Personnel：C/P）により示唆されている。

3-3 効果発現に貢献した要因

（１） 能力開発アプローチに関すること
活動実施において以下の手法を用いたことで効果発現が促進された。
- フェーズ 1 で開発された研修運営管理フロー、評価手法、予算計画ツール
- 研修生への表彰制度
- SWC 研修センター間の講師派遣、研修生受入による技術交流
- 合同セミナー及びスタディツアー
- モロッコ第三国研修、及びモロッコ人専門家招聘
- 他の JICA 技術協力プロジェクト及びプログラムとの連携

（２） プロジェクト管理体制
フェーズ1から構築されたJICA専門家とDWST、DWSTとSWCとの信頼関係は、フェーズ2に入り、JCC、合同セミナー、定例会議等の機会を通し、更に醸成され、SWC間のコミュニケーションも活性化された。また、C/Pのチームワークは本プロジェクトを通し強化され、より円滑なプロジェクト運営管理が実現した。

（３） 適切な C/P の配置
フェーズ1においてDWSTの研修により育成された人材が、研修センター長及びコースコー

ディネーターとしてSWCの研修センター運営管理に大きな役割を果たしている。

（４） DWSU、DWST、SWC による本プロジェクトの高い認知度及び活動への参画
本プロジェクトの認知度の高さは、フェーズ1とフェーズ2を通し、多くのSWCによって新規研修センターが自助努力により設置されたことにも現れている。また、活動（JCC会議、合同セミナー、研修活動等）への積極的な参加の高さは顕著である。

（５） 他機関ステークホルダーの参画
SWC以外の他機関から多くの職員がプロジェクト活動（研修活動、合同セミナー）に参加した。また、DWSTによる研修コースの提供を通し、給水と衛生分野の人材育成を行う国際機関との連携が促進された。

３-４　問題点及び問題を惹起した要因

（１） 実施プロセスに関すること（成果 1、成果 3 に係るスーダン側の投入の遅延）
成果1に関し、DWSTの拡張を目的とし、スーダン側DWSUの投入として想定していた新規キロテン研修センターの建設が開始されていない。そのため、収容規模・体制の拡張の実現には至っていないが、本プロジェクト期間を通し、DWSTは既存の人材と施設機材を活用することで、毎年コース数及び実施回数を増やすことができた。
成果3に関しては、モニタリング部署の設置が遅れ、3年次の中間レビュー後にようやくDWSU及びPSWCsで担当部署の形成と人員配置が行われた。4年次に同部署のメンバーは各州においてウォーターヤードのモニタリング活動（ベースライン調査）を開始した。2016年1月までに両州の全郡で同調査を終え、順次定期的なモニタリングを開始する。C/P及びJICA専門家の見解では、今後、研修コースと給水施設のモニタリング活動を両立して継続していくには、より大規模な投入（人材、車両、水質検査機材等含め）と時間を要するであろうとのこと。

３-５　結論

本調査時点で全ての成果は概ね達成しており、プロジェクト目標の達成度も高いことが確認された。プロジェクトの「妥当性」「有効性」はいずれも高く、「効率性」「持続性」はやや高いと評価する。「インパクト」については、上位目標の達成の見込みが低いことから中程度と判断される。しかし、上位目標指標については既にパイロット州及びその他 SWC において、好事例がいくつか確認されており、研修を受けた SWC 職員が給水施設運転・維持管理の現場で習得技術と供与機材を活用し、改修、維持管理、運営業務の向上に貢献していることは特筆に値する。なお、プロジェクト期間の延長は行わない。

３-６　提言（カッコ内は、各提言の責任組織）

（１） SWC の研修運営管理システム強化のための技術支援（DWST、PSWC）
（２） 次期 WASH 戦略計画へのモニタリング結果の反映（PSWCs）
（３） モニタリング活動の拡充（特に、パイロット州以外、ウォーターヤード以外の給水施設）（SWCs）
（４） モロッコとの技術交流の継続（DWSU）
（５） 新規キロテン地区研修センターの設立（DWSU）

３-７　教訓

（１） オーナーシップを向上する上で有効な手法
本プロジェクトで取り入れた、以下の手法は、C/Pのプロジェクトに対するオーナーシップを向上する上で、その有効性が証明された。

- 類似国モロッコの給水分野経験からの学び
- 研修生の表彰制度
- C/P に加え給水分野関係機関が情報及び意見を交換する機会となる合同セミナー

（２） 類似案件実施への教訓

本プロジェクトの上位目標を達成する為には、プロジェクト目標が達成されたとしても複数の外部要因を満たす必要があるプロジェクトデザインであった。今後、類似案件を形成する際は、より実現可能、入手可能な情報・データを踏まえた、目標と指標を検討することが望ましい。

Summary of Terminal Evaluation Results

<table>
<tr><td colspan="3">1. Outline of the Project</td></tr>
<tr><td colspan="2">Country: Republic of Sudan</td><td>Project title: Project for Human resources Development for Water Supply Phase 2</td></tr>
<tr><td colspan="2">Issue/Sector: Water Resources Management</td><td>Cooperation scheme: Technical Cooperation Project</td></tr>
<tr><td colspan="2">Division in Charge:
Global Environment Department</td><td>Total Cost：615 million Japanese Yen (at the time of the evaluation)</td></tr>
<tr><td>Period of Cooperation</td><td>(R/D: 14 August 2011)
1 November 2011 – 30 September 2015 (4 years)</td><td>Partner Country’s Implementing Organization:
Drinking Water and Sanitation Unit (DWSU)
Drinking Water and Sanitation Unit Training Center (DWST), Federal Ministry of Water Resources and Electricity
State Water Corporations (SWCs)</td></tr>
<tr><td colspan="2"></td><td>Supporting Organization in Japan:
Earth System Science Co., Ltd.</td></tr>
<tr><td colspan="3">Related Cooperation:
【JICA】
・ Technical Cooperation Project “Capacity Development Project for the Provision of Services for Basic Human Needs in Kassala” (2011-2014)
・ Technical Cooperation Project “Project for Human Resources Development for Darfur and the Three Protocol Areas” (2009-2013)
・ Technical Cooperation Project “Frontline Maternal and Child Health Empowerment Project Phase 2” (2011-2014)
【United Nations Children’s Fund: UNICEF】
・ “Water Environment Sanitation (WES) Project” (1996-)
【United Nations Office for Project Services: UNOPS】
・ “Darfur Urban Water Supply Project” (2010-2014)
【International Organization for Migration: IOM】
・ Water supply Project in South Kordofan</td></tr>
<tr><td colspan="3">1-1.Background of the Project
In Sudan, access rate to improved water source was 67.5% in 1990[7]. However, the situation has been stagnant at around 65% (2010)[8] because of the effects of civil wars[9]. Government of Sudan has made efforts on improving water supply facilities with the aim to achieve full coverage of adequate and safe water supply at adequate consumption rates by the end of 2031 as stated in “Quarter Century Strategy for Water Supply, 2007-2031”[10] .
The Decentralization Law, which was approved in 1994, led the local government to have much authority, transferred from the federal government. Before the decentralization, the Public Water Corporation (hereinafter referred to as “PWC”), which renamed as Drinking Water and Sanitation Unit (hereinafter referred to as “DWSU”[11]), was responsible for water supply throughout Sudan. Under the decentralization policy, the responsibility for operation and maintenance (O&M) of the</td></tr>
</table>

[7] Source: WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (http://www.wssinfo.org/)

[8] These figures are average rates of 14 states as of 2010 (Blue Nile, Gedaref, North Kordofan, Northern, Red Sea, River Nile, Sennar, South Kordofan, White Nile, Gezira, Kassala, North Darfur, South Darfur, West Darfur). 91.1% (urban), 56.8% (rural). Source: Documents prepared by JICA experts based on data from 2008 Census and state statistic offices.

[9] Comprehensive Peace Agreement was signed between northern Sudan and Southern Sudan in 2005 followed by the Darfur Peace Agreement in May 2006 and the Eastern Sudan Peace Agreement in October 2006.

[10] Source: “Quarter Century Strategy for Water Supply First phase programme 2007-2011”, “National Water Corporation, Ministry of Irrigation and Water Resources (2007).” The goal is set at 50 liters per capita per day (L/C/day) for the rural population and 150L/C/day for the urban population. As of 2010, consumption rate is 24.0L/C/Day (18.7 in rural 42.1 in urban) according to the document prepared by JICA experts based on data of SWC and WES projects 2010.

[11] Ministry of Irrigation and Water Resources was reformed to Ministry of Water Resources in December 2011 and then to Ministry of Water Resources and Electricity in July 2012. Upon this reform in 2012, PWC changed to DWSU to cover sanitation aspect in 2013.

water supply facilities was transferred from PWC to State Water Corporations (hereinafter referred to as "SWCs"). Therefore, the role of the PWC became limited to water supply policy, the construction of large-scale water supply facilities, coordination of the international cooperation projects, monitoring of SWCs and human resources development. However, the water sector in Sudan faced serious problems associated with lack of budget, human resources, and equipment in most SWCs.
In response, the Human Resources Development Project for Water Supply (hereinafter referred to as "Phase 1") was implemented with technical cooperation by JICA for 3 years from June 2008 to March 2011. As a result, PWC Training Center, which renamed to Drinking Water and Sanitation Unit Training Center (hereinafter referred to as "DWST"), developed its training implementation capacity[12]. On the other hand, the issue of human resources development in the water supply sector in the state level remained to be improved further. Therefore, the Government of Sudan requested the Phase 2 to the Government of Japan with the aim to enhance the management of the water supply system for the entire country. The Project has been carried out since 2011 for the period of 4 years until September 2015.

1-2. Project Overview

In order to improve the water supply services in Sudan, the Project aims to train human resources in the water supply sector through the implementation of training courses by SWCs and DWST.

(1) **Overall Goal:** Water supply system is properly managed in Sudan.
(2) **Project Purpose:** Human resources in water supply sector are properly trained in Sudan.
(3) **Outputs:**
1) Training courses are implemented by DWST based on its mid-term/long-term human resources development plan.
2) Training course implementation structures in Pilot State Water Corporations (PSWCs) are developed by PSWCs in collaboration with DWST.
3) Monitoring system is established within DWSU and pilot SWCs for training course implementation and O&M of water supply system of PSWCs.
4) Training course implementation structure is developed within each SWC in Sudan in collaboration with DWST.

(4) **Inputs**

Japanese side:

Short-term Experts:	10 short-term experts (108.74 MM)
Trainees received:	46 persons (for Training in Morocco, including 10 for the plan)
Provision of Equipment:	Equivalent to 245,249,213 JPY
Local Operational Expenses:	Equivalent to 62,607,000 JPY

Sudanese side:

Counterpart Personnel:	Total of 68 C/Ps were assigned by DWSU/DWST (16), White Nile SWC (28), Sennar SWC (24)
Provision of Space:	Project offices (DWST, White Nile SWC, Sennar SWC), Office furniture, communication network, electricity etc., Training facilities and space
Local Cost Sharing:	DWST: Equivalent to 223,226,829 JPY White Nile SWC: Equivalent to 36,197,222 JPY Sennar SWC: Equivalent to 31,906,943 JPY

2. Evaluation Team

Member of Evaluation Team	<Japanese Side>		
	Team leader	Mr. Yukihiko Ejiri	Senior Assistant Director, Water Resources and Disaster Management Group, Global Environment Department, JICA
	Evaluation Planning	Mr. Koji SHIMIZU	Deputy Director, Water Resources Management Team 2, Water Resources and Disaster

[12] SWC was changed to DWSU so as to cover sanitation aspect in 2013, and accordingly PWCT was renamed to DWST.

			Management Group, Global Environment Department, JICA
	Evaluation Analysis <Sudanese Side>	Ms. Hiroyo Onozato	Researcher, Global Link Management
	Course coordinator	Mr. Egbal B. Alamir	Department of Training Management, Drinking Water and Sanitation Unit Training Center (DWST)
Schedule of survey	22 February – 12 March, 2015		Type of Evaluation: Terminal Evaluation

3. Result of Evaluation

3-1. Project Performance

3-1-1. Outputs

(1) Output 1 (Training courses are implemented by DWST based on its Mid-term/ Long-term human resources development plan.)

Output 1 has mostly been achieved by the time of the terminal evaluation as shown in the indicators.

DWST prepared the outline of the "Mid-term and Long-Term Human Resources Development Plan 2012-2026." JCC discussed and approved it at the 2nd JCC meeting in June 2012. Based on this plan, DWST has been preparing annual training plan (Indicator 1-1). By the Mid-term review in January 2014, it has been confirmed that contribution rates of DWST training coordinators on planning and implementation of training courses reached 100% (Indicator 1-2). DWST has been implementing more than 20 training courses annually (Indicator 1-3). Therefore, it is confirmed that DWST has implemented training courses based on its Mid-term/ Long-term human resources development plan.

(2) Output 2 (Training course implementation structures in PSWCs are developed by PSWCs in collaboration with DWST.)

Output 2 has been achieved by the time of the terminal evaluation as shown in the indicators.

After starting training center in 2012, both PSWCs have achieved target contribution rates (annual average of all courses) of 80% in 2013 (Indicator 2-1). According to the annual training implementation plan prepared, each PSWC have implemented more courses than the previous years (Indicator 2-2). Thus, it is identified that training course implementation structures in PSWCs have been developed by PSWCs.

(3) Output 3 (Monitoring system is established within DWSU and pilot SWCs for training course implementation and O&M of water supply system of PSWCs.)

Output 3 has been achieved by the time of the terminal evaluation as shown in the indicators.

The monitoring manuals were developed by March 2015 and distributed to SWCs as well as to international organizations working in the water supply sector at JCC in March 2015 (Indicator 3-1). Monitoring & evaluation units formulated after the Mid-term review in January 2014 developed the monitoring plan and manuals with formats for training implementation and O&M of water yards[13]. Data of training implementation has been regularly sent from PSWCs to DWST. On the other hand, along with the plans[14], data of each water yard at locality level have been compiled in the database by monitoring & evaluation unit of PSWC. Moreover, in PSWCs, results of monitoring data analysis were compiled in the action plans for rehabilitation of water yards by monitoring & evaluation units. For the rests of the localities, monitoring activities for baseline survey will be completed by December 2015 in Sennar state and by January 2016 in White Nile state (Indicator 3-2).

Therefore, the monitoring system for training implementation has been established by PSWCs. It is confirmed that monitoring for water supply facilities have been started one by one at locality level in pilot states, and the monitoring system has been under establishment.

[13] Water yard monitoring formats were developed for (1) Baseline survey, (2) Annual survey for SWC monitoring units, (3) Seasonal survey, (4) Monthly survey for SWC locality, and (5) Daily recording for operators.

[14] "Sennar SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014.", "White Nile SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014."

(4) Output 4 (Training course implementation structure is developed within each SWC in Sudan in collaboration with DWST.)

Output 4 has been achieved by the time of the terminal evaluation as shown in indicators.

DWST has been working on finalization of the "Human resources development manual" at the time of the terminal evaluation. Once this manual is created, copies will be distributed to all SWCs (Indicator 4-1). Before the Project, there was no training center at any of SWCs besides DWST. Through Phase 1 and Phase 2, 14 SWCs out of 18 SWCs established training centers. These SWCs hosted Joint Seminar. By November 2014, Joint Seminar has been implemented for 6 times for sharing outputs of PSWCs as well as achievements of other newly established SWC training centers (Indicator 4-2).

Thus, although progresses are varied among different SWCs, it can be said that training course implementation structures have been developed within SWCs in Sudan.

3-1-2. Project Purpose (Human resources in water supply sector are properly trained in Sudan.)

The Project Purpose has been achieved at the time of the terminal evaluation as shown in the indicators.

Total number of the trainees in DWST and SWCs exceeds 3,196 (Indicator 1). Renovation and maintenance of the water yards have been conducted for more than 20 annually in each PSWC. In Year 4, 32 facilities (57 items) in Sennar state and 48 facilities (85 items) in White Nile state have been maintained and/or renovated (since October 2014 as of February 2015) (Indicator 2).

3-2. Evaluation Results

3-2-1. Relevance: High

Relevance of the Project is high. The Project is in line with policies and strategy of the Government of Sudan, the Government of Japan and Japanese technical expertise. In 2 pilot states, collaboration with other JICA technical cooperation projects and scheme have brought about mutual effects and meet the needs of social development.

3-2-2. Effectiveness: High

Effectiveness of the Project is high. Two indicators of the Project Purpose "Human resources in water supply sector are properly trained in Sudan" have been achieved. Achievement of the Project Purpose has been led by 4 Outputs. Moreover, contributing factors for achievement of the Project include the technical exchange with Morocco and also with other JICA technical cooperation projects. For SWCs in the conflict-affected areas where DWST staff and JICA Experts were restricted to travel, capacity building was conducted through offering regular and special training courses at DWST and PSWCs, and training in Morocco.

3-2-3. Efficiency: Relatively high

Efficiency of the Project is relatively high. All Outputs have mostly been achieved by the time of the terminal evaluation. Contributing factors for achieving the Outputs include utilization of experiences gained through DWST training, OJT for some technical courses, and collaboration among stakeholders. Regarding the delay in construction of new Kilo Ten training center, which was designed to have the larger capacities, caused changes in scope of some activities under Output 1. Although DWST has continued training implementation in the existing facilities, DWST has managed implementing the training plan every year at the larger scale than previous years. Regarding monitoring activities for O&M of water facilities, DWSU and PSWCs established monitoring and evaluation department/units after the Mid-term review. As a result, efficiency of Output 3 has negatively been affected.

3-2-4. Impacts: Moderate

Impact of the Project is moderate because Overall Goals is unlikely to be achieved within three to five years after the completion of the Project. In order for water supply facilities in Sudan to be properly managed, it is essential to fulfill external factors (financial, organizational, facilities and equipment, security condition etc.) in addition to the continuation of the Project Purpose. Moreover, it is also prerequisite to establish the monitoring system at every state and grasp the situation of the

existing water supply facilities throughout the country. Considering several external factors and years to be taken to improve the system for water supply facilities, inadequate setting of the Overall Goal resulted in the negative element for assessing the impact.
On the other hand, regarding the indicator set for the Overall Goal "SWC staff utilizes their knowledge and technical skills to maintain and operate water supply facilities", it is expected to be achieved to some extent in two pilot states and some other states. Good practices have been identified in cases of utilization of trained skills and knowledge by SWC staff. Therefore, if necessary inputs are allocated for O&M of water supply facilities in the sustainable manner, trained SWC staff members, technicians and operators will be able to properly manage water supply facilities in their states and localities with utilization of their knowledge & skills. Other notable ripple effects include 1) increases in inquiry for training courses by international organizations and local organizations in the water supply sector associated with improvement of reputation of DWST and 2) establishment of training centers in 14 SWCs by their self effort.

3-2-5. Sustainability: Relatively high

Sustainability of the Project is relatively high as evidenced by the following factors.

(1) Policy and institutional aspect: High

Importance of the capacity building of human resources in the water supply sector is emphasized in strategies of Sudan. DWSU and DWST as well as PSWCs developed various plans relevant to human resources development, O&M of water yards, and monitoring. In future, if these plans are implemented with proper management of human resources, adequate O&M of water supply facilities will be promoted.

(2) Institutional aspect: High

Regarding human resources development, training implementation structured is established in DWST. If the "Mid-term/long-term human resources development plan 2012-2026" has continuously implemented, DWSU and DWST will be able to increase sustainability of the Project effects. For implementation of the training center action plan for 2015-2018, both PSWCs have strong will to continue training center activities and sufficient number of course coordinators. Regarding O&M of water supply facilities, it is expected to improve quality of O&M of water yards by mobilizing trained staff as well as machinery and equipment provided through the Project. In terms of monitoring of water yards, monitoring structure is clarified in the manual, and both DWSU and PSWCs recognize importance of introducing the constant monitoring system.

(3) Financial aspect: Relatively high

Regarding human resources development, although disbursement of annual budget is depend on the financial condition of federal government for DWST as well as of state government and water tariff revenue for PSWCs, DWST and PSWCs have constantly secured training budget every year throughout the Project. Moreover, both PSWC training centers have prepared action plan for the next 3 years.
Regarding O&M of water supply facilities, SWCs depend on water tariff revenue to cover O&M costs. Therefore, common challenges are remained for all SWCs in how to reduce O&M costs. As for monitoring of water yards by operators and locality staff, costs are also financed by PSWC sector/locality offices. However, PSWCs anticipate that their vehicles and equipment are insufficient to outreach all the water yards that are mostly in remote areas in the vast extent of land.

(4) Technical aspect: Relatively high

Regarding human resources development, DWST became the main training center for the water supply sector in Sudan. In PSWCs, training center directors and coordinators are confident about training management by utilizing the manuals, methods, tools and equipment introduced by the Project. Regarding O&M of water supply facilities, DWST has been taking initiative in introducing new technology to their training courses. On the other hand, in order to maximize the effect of training and link to the quality O&M of water supply facilities, C/Ps in PSWCs recognize that further technical supports are in needs for monitoring activities as well as technical training activities in O&M of water supply facilities.

3-3. Factors promoting better implementation process

(1) Utilization of useful capacity development methods in implementation of activities

The following methods have led to promoting generation of the Project effects.

- Training management cycle, evaluation method and budget planning tools developed at DWST in Phase 1
- Awarding system for the trainees with high technical levels
- Technical exchange among SWCs
- Joint seminar and study tours
- Training in Morocco and dispatch of experts from Morocco
- Collaboration with other JICA Projects and Program

(2) Project management system

Relationship among C/P organizations had already been developed through Phase 1. C/Ps and JICA Experts have activated communications through JCC meetings, series of the Joint Seminar and regular meetings of SWC DGs with DWSU and DWST. Moreover, team work spirit of C/Ps have strengthened through the Project and brought about effective Project management.

(3) Appropriate assignment of C/Ps

Those who were trained in Phase 1 played significant roles as training center directors of SWCs as well as training instructors and coordinators in PSWCs.

(4) High recognition and participations of DWSU, DWST, SWCs

Through Phase 1 and Phase 2, DWSU and DWST staff members have highly recognized the Project activities. SWCs have highly recognize the Project as reflected in the establishment and operations of training centers in 14 states and their active participations in JCC, Joint Seminar and training activities.

(5) Involvement of other stakeholders

Through training activities and Joint seminar, other organizations besides SWCs involved in the Project as trainees. Moreover, international organizations collaborated with DWST in human resources development in the water, sanitation and hygiene sector.

3-4. Factors inhibiting the Project process

(1) Factors concerning to Planning (Delay in Changes in pre-condition for Output 1 & Output 3)

・Delay in construction of new Kilo Ten training center, which was designed to have the larger capacities, caused changes in scope of some activities in Output 1. Although DWST has continued training implementation in the existing facilities, DWST has managed implementing the training plan every year at the larger scale than previous years.

・There was a delay in establishment of the monitoring units. After the Mid-term review in January 2014, DWSU and PSWCs formulated the monitoring and evaluation department/units and started monitoring activities (baseline survey) in Year 4. It is planned to complete the baseline survey for all localities by January 2016 and then start the regular monitoring accordingly. It is common understanding among C/Ps and JICA Experts that more time and inputs are necessary to monitor O&M status of all the existing water yards most of which are located in remote areas.

3-5. Conclusion

Among five evaluation criteria, *Relevance* and *Effectiveness* of the Project are evaluated high. *Efficiency* and *Sustainability* of the Project are evaluated relatively high. *Impact* of the Project is evaluated moderate because of the unlikeliness of achievement of the Overall Goal within three to five years after the Project completion. However, good practices have been identified such as utilization of trained skills and knowledge by SWCs staff and their contributions on improvement of O&M of water supply facilities. Common challenges are remained for PSWCs to involve all the operators and locality offices and make the monitoring system function to cover all water yards. Thus *Sustainability* of the Project is evaluated relatively high.

3-6.Recommendations

In order to secure sustainability of the Project and fill the gap to achieve the overall goal, recommendations are made to DWSU, DWST and PSWCs on the following points.

(1) To provide technical support to SWCs for strengthening their training management system
(2) To reflecting the monitoring results to the next WASH strategic plan
(3) To introduce the monitoring system to other SWCs and other types of water facilities
(4) To continue technical cooperation with Morocco
(5) To establish new Kilo Ten Training Center

3-7.Lessons Learned

In order to increase ownership of the C/Ps for the Project, the following methods were proved for maximizing their effectiveness.

- Learning from experiences of Morocco in the water supply sector which has similarities with Sudan
- Award system for the best trainees and best training center to encourage C/Ps for further improvement of their organizations associated with increasing their sense of ownership
- Joint seminar hosted in various states for sharing information and experiences among SWCs and other stakeholders in water supply development

第１章　終了時評価調査の概要

１－１　調査団派遣の経緯と目的

スーダンの安全な水へのアクセス率は 1990 年に 67.6 パーセント[15]を記録したものの、国内の混乱により[16]、その後も 65 パーセント（都市部 91.1%、地方部 56.8%、2010 年時点[17]）と停滞している。スーダン政府は給水施設の整備に努力を重ね、国家 25 カ年給水計画（2007-2031 年）では、2031 年までに水使用量を地方部で 1 日 1 人当たり 50 リットル（L/人/日）、都市部で 150（L/人/日）、同アクセス率を人口の 100 パーセントにすることを目指している[18]。

給水事業にかかる責任・権限は従来、国営水公社〔現在は水資源・電力省飲料水衛生局（Drinking Water and Sanitation Unit：DWSU）に組織改編[19]〕が有していたが、地方分権化政策により各州の水公社に委譲され、国営水公社の役割は給水政策の策定、州をまたぐ大規模給水施設建設等に限定されることとなった。一方、各州水公社では人材開発がほとんど行われておらず、責任や権限が委譲されたにもかかわらず、給水施設の整備や維持管理に支障をきたす状態であった。そこで JICA は 2008 年 6 月から 2011 年 3 月まで「水供給人材育成計画プロジェクト」（以下、「フェーズ 1」と記す）を実施し、各州水公社で中核となる技術者を育成するために国営水公社が設置した国営水公社研修センター〔現在は飲料水衛生局研修センター（Drinking Water and Sanitation Unit Training Center：DWST）に組織改編[20]〕の立ち上げと機能の強化を支援した。フェーズ 1 を通して DWST の研修実施能力は強化されたものの、給水分野の更なる人材育成のためには、実務担当者を抱える各州水公社の研修実施能力向上の必要性が認められていた。

このような背景に基づき、スーダン政府からの要請を受けて JICA は 2011 年 11 月から 2015 年 9 月までの予定で「水供給人材育成プロジェクト・フェーズ 2」（以下、「本プロジェクト」と記す）を実施している。

---

[15] 出所：WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (http://www.wssinfo.org/)

[16] 2005 年 1 月 9 日、北部のスーダン政府と南部の反政府勢力のスーダン人民解放運動・軍（SPLM/A）との間で包括的和平合意（Comprehensive Peace Agreement）が署名された。2006 年 5 月にはダルフール和平合意（Darfur Peace Agreement：DPA）が署名され、2006 年 10 月 14 日には東部スーダン和平合意（Eastern Sudan Peace Agreement：ESPA）が締結された。

[17] 2010 年時点の 14 州の平均値 （青ナイル州、ゲダレフ州、北コルドファン州、北部州、紅海州、リバーナイル州、センナール州、南コルドファン州、白ナイル州、ゲジラ州、カッサラ州、北ダルフール州、南ダルフール州、西ダルフール州）
出所：2008 年統計調査、state statistic offices の情報を基に JICA 専門家が作成した資料

[18] 出所：“Quarter Century Strategy for Water Supply First phase programme 2007-2011”, “National Water Corporation, Ministry of Irrigation and Water Resources (2007)”
JICA 専門家作成資料（出所：2010 年 SWC と WES projects データ）によると、2010 年時点の水使用量は 24.0L/人/日（地方部 18.7 L/人/日、都市部 42.1 L/人/日）。

[19] 2011 年 12 月に灌漑・水資源省は水資源省に改編され、その後、2012 年 7 月に水資源・電力省に改編された。2013 年に国営水公社（PWC）は衛生分野をカバーする為、飲料水衛生局（DWSU）へ改編された。

[20] 2013 年に PWC が DWSU に改編され、PWC 研修センターも DWST へ改編された。

本プロジェクトでは、パイロット地域である白ナイル州とセンナール州の水公社（Pilot State Water Corporation：PSWC）[21]の人材育成と、スーダン全州[22]を管轄する DWST の更なる能力強化を目指し、総括/研修計画/給水計画、副総括/組織管理/水道料金管理、井戸管理、給水施設管理（浄水場/管網管理)、データ管理/モニタリング等の分野で 10 名の専門家を派遣して活動を進めている。

2014 年 1 月に実施した中間レビューでは、プロジェクトの活動は概ね計画通り進められているものの「研修実施と給水施設維持管理のモニタリング体制の確立（成果 3)」等の活動に遅れがあるとされ、プロジェクト終了までにプロジェクト目標を達成する見込みは不確かであると評価された。5 項目評価については、妥当性は高いものの、有効性、効率性、インパクト、持続性は中程度と評価された。

今回実施した終了時評価調査は、2015 年 9 月のプロジェクト終了を控え、プロジェクト活動の実績、成果を評価、確認するとともに、今後のプロジェクト活動に対する提言及び今後の類似事業の実施に当たっての教訓を導くことを目的とした。

１－２　調査団日程

本現地調査は 2015 年 2 月 22 日から 3 月 12 日の日程で実施された（詳細は「付属資料 1：合同評価報告書　ANNEX 5-1」を参照)。

１－３　調査団構成

(1)　日本側

分野	氏名	所属
総括	江尻　幸彦	JICA 地球環境部　水資源・防災グループ
調査管理	清水　浩二	JICA 地球環境部　水資源・防災グループ
評価分析	小野里　宏代	グローバルリンクマネージメント株式会社

(2)　スーダン側

氏名	所属
Mr. Egbal B. Alamir	DWST コースコーディネーター

１－４　主要面談者

主要面談者は「付属資料 1：合同評価報告書　ANNEX 5-2」のとおり。

[21] パイロット州の安全な水へのアクセスは白ナイル州で 61.1%（都市部 84.2%、地方部 49.5%)、センナール州で 82.2% （都市部 92.9%、地方部 79.3%)。2010 年時点の使用量は白ナイル州で 25.4 L/人/日（都市部 32.2 L/人/日、地方部 20.5 L/人/日)、センナール州で 34L/人/日（都市部 50.0 L/人/日、地方部 30.0 L/人/日)。

[22] プロジェクト期間中、スーダンの州の数は 15 州から 18 州に増加した【1. ハルツーム州、2. 白ナイル州、3. センナール州、4. 北部州、5. リバーナイル州、6. ゲジラ州、7. ゲダレフ州、8. カッサラ州、9. 北コルドファン州、10. 紅海州、11. 南コルドファン州、12. 北ダルフール州、13. 西ダルフール州、14. 南ダルフール州、15. 青ナイル州、16.　中央ダルフール州（西ダルフール州より分離、2012 年 1 月)、17. 東ダルフール州（南ダルフール州より分離、2012 年 1 月)、18. 西コルドファン州（南コルドファン州より分離、2013 年 2 月)】。

第２章　終了時評価の方法

２－１　評価の手法

日本側、スーダン側評価調査チームが合同で、「新 JICA 事業評価ガイドライン第 1 版」[23]に基づき、現行プロジェクト・デザイン・マトリックス（Project Design Matrix : PDM）と評価 5 項目（表 2-1）による評価手法を用い、以下のとおり実施した。PDM 最新版（バージョン 5、以下、ver.5）は「付属資料 1：合同評価報告書　ANNEX 1」を参照。

(1) PDM の最新版（ver.5）に基づき評価デザインを検討し、評価グリッドを作成した（「付属資料 1 : 合同評価報告書　ANNEX 3-2」を参照)。プロジェクトの達成度合いは、主に PDM 指標を基に評価し、プロジェクト目標の達成度合いに貢献した要因、及び阻害した要因を分析した。
(2) プロジェクトの実績に関する情報を収集し、プロジェクトの実施プロセスを把握するとともに、投入実績、成果の達成度、プロジェクト目標の達成見込みを確認した。
(3) 評価 5 項目（妥当性、有効性、効率性、インパクト、持続性）の観点から、評価グリッドに沿って評価した。終了時評価であることから、5 項目の中でもプロジェクト目標の達成度合い（有効性)、インパクトの発現状況、組織、及び財政面での持続性に特に着目し検証した。
(4) プロジェクト残存期間及びプロジェクト終了後の活動に係る提言、及び類似案件に対する教訓を抽出した。

表 2－1　評価 5 項目

妥当性	プロジェクトのターゲットグループのニーズへの整合性、プロジェクト内容の先方政府と援助側の政策や優先順位との整合性、プロジェクトの戦略やアプローチの妥当性に関する視点。
有効性	プロジェクトの達成見込みと、その達成がアウトプットの達成によりもたらされるかに関する視点。
効率性	アウトプットの達成状況と投入がいかにアウトプットの達成に転換されているか（量的、質的観点）に関する視点。他のアプローチと比して最も効率的な方法を適用しているかも必要に応じ問う。
インパクト（予測）	上位目標の達成見込みと、プロジェクトの実施による直接/間接的な影響。また、正/負、予期した/予期していない影響の計測。
持続性（見込み）	プロジェクト終了後にプロジェクトがもたらした効果の持続性を問う視点。

２－２　主な調査項目とデータ収集・分析方法

評価グリッドに基づき、5 項目それぞれに設置した調査項目に沿って定性的、定量的データを、以下の方法で収集した。調査項目については、「付属資料 1：合同評価報告書　ANNEX 3-2　評価

[23] 新 JICA 事業評価ガイドライン第 1 版（JICA 評価部、2010 年 6 月）

グリッド（調査結果)」を参照されたい。

(1) 文献調査

プロジェクト関連資料のレビュー

(2) 調査票調査

質問票回答数：専門家チーム 1 件、DWST 1 名、PSWCs 2 名、SWC 11 名

(3) キー・インフォーマント・インタビュー

専門家チーム 7 名、カウンターパート機関 72 名、ステークホルダー5 機関 7 名

面談者一覧は「付属資料：合同評価報告書 ANNEX 5-2」を参照。

(4) 現地踏査

- DWST 水質検査研修、給水施設管理研修、キロテン地区ワークショップ、新規研修センター建設予定地
- センナール州 SWC 研修センター施設、ワークショップ・機材倉庫、井戸管理実習、シンジャ浄水場・水質検査ラボ、シンジャ郡内給水施設（ウォーターヤード)、シンジャ郡（セクター）事務所
- 白ナイル州 SWC 研修センター施設・ワークショップ、電気管理研修、コスティ浄水場・水質検査ラボ、タンダルティ郡内給水施設（ウォーターヤード）
- 北コルドファン州 SWC 研修センター施設・ワークショップ等、オベイド浄水場・水質検査ラボ
- ゲジラ州 SWC 研修センター施設・ワークショップ（改修中）
- ハルツーム州 SWC ソバ浄水場、ウォーターヤード

第３章　プロジェクトの実績と実施プロセス

本プロジェクトの実績は PDM ver.5 に基づいた投入、活動、成果、プロジェクト目標、上位目標の達成状況に関して確認した（付属資料 1：合同評価報告書　ANNEX 1」参照）。

３－１　投入実績

３－１－１　日本側の投入

(1)　専門家派遣

プロジェクト終了までの投入計画（合計 108.74 人月（MM））に基づき、①総括/研修計画/給水計画（1）、②副総括/組織管理/水道料金管理、③研修施設管理/給水計画（2）、④井戸管理、⑤給水施設管理（浄水場/管網管理）、⑥機械・電気/機材管理、⑦データ管理/モニタリング、⑧水質管理、⑨コミュニティ啓発、⑩衛生管理の分野においてシャトル型専門家が延べ 10 名派遣されている。本調査時点の派遣実績は合計 102.63 人月（MM）（2015 年 2 月末時点）である。詳細は「付属資料 1：合同評価報告書　ANNEX 2-1」を参照。

(2)　供与機材

プロジェクト実施に必要な研修用機材及びオフィス機器が DWST 及び 8 州の SWC へ供与された。供与機材リスト詳細は「付属資料 1：合同評価報告書　ANNEX 2-5」を参照。

供与機材及び携行機材の支出実績（1 年次から 3 年次）は、合計 2 億 4,454 万 4,213 円（1 年次 2 億 2,308 万 5,213 円、2 年次 752 万 8,000 円、3 年次 1,193 万 1,000 円）である[24]。尚、4 年次には、70 万 5,000 円が支出予定である。従って、機材費総計は 2 億 4,524 万 9,213 円相当（約 888 万 9,298 SDG[25]）である。詳細は「付属資料 1：合同評価報告書　ANNEX 2-4（2)」を参照。

(3)　現地業務費

日本側現地業務費として合計 6,260 万 7,000 円相当（約 311 万 8,466SDG）が、プロジェクト終了までに支出見込みである[26]。詳細は「付属資料 1：合同評価報告書　ANNEX 2-4（1)」を参照。

(4)　モロッコ第三国研修

モロッコでの第三国研修はプロジェクト期間において合計 4 回計画されている。本調査時点では、3 回実施済であり、延べ 36 名の実施機関（Counterpart Personnel：C/P）が参加した。4 年次に計画されている 4 回目の研修には、10 名の C/P が参加予定である。研修内容、

[24] 各年次の期間：1 年次（2011 年 11 月－2012 年 8 月)、2 年次（2012 年 10 月－2013 年 6 月)、3 年次（2013 年 9 月－2014 年 7 月)、4 年次（2014 年 9 月－2015 年 10 月）

[25] スーダンポンド（SDG）換算額は契約年次開始月の JICA 公式レートを適用。【28.548 円/SDG（第 1 年次 2011 年 11 月)、17.742 円/SDG（第 2 年次 2012 年 10 月)、22.380 円/SDG （第 3 年次 2013 年 9 月)、18.342 円/SDG（第 4 年次 2014 年 9 月)】

[26] 現地業務費支出内訳は、1 年次 651 万 4,000 円、2 年次 1,518 万 6,000 万円、3 年次 1,991 万 3,000 円は支出実績額、4 年次 2,099 万 4,000 円はプロジェクト終了までの支出予定額である。上記脚注 25 同様、スーダンポンド（SDG）換算額は契約年次開始月の JICA 公式レートを用いて算出。

及び参加者詳細は「付属資料 1：合同評価報告書　ANNEX 2-3」を参照。

(5)　モロッコ人専門家派遣

モロッコ人専門家が延べ 11 名（第 1 回目 5 名、第 2 回目 4 名、第 3 回目 2 名）、スーダンへ招請された。詳細は「付属資料 1：合同評価報告書　ANNEX 2-2」を参照。

３－１－２　スーダン国側の投入

(1)　カウンターパート（C/P）の配置

DWST 及び PSWCs は延べ 68 名の職員を C/P として配置した（DWSU 及び DWST16 名、センナール州 SWC24 名、白ナイル州 SWC28 名）。プロジェクトディレクター（DWSU 総裁）とプロジェクトマネージャー（DWST センター長）に加え、DWST 及び PSWCs において、各研修コース・専門分野別及びモニタリング部署に C/P が配置され、専門家とともに活動に取り組んでいる。詳細は「付属資料 1：合同評価報告書　ANNEX 2-6」を参照。

(2)　施設の提供

DWST 及び各 PSWC 内に専門家用執務室及び研修用スペースが提供された。このほか、プロジェクト活動で必要な設備及び機材が提供された。PDM 上、スーダン側の投入として明記されているキロテン地区新規研修センターの建設は、資金調達の遅延等により本調査時点で完了していない。（詳細は第 3 章 3-6-3（1）を参照）

(3)　プロジェクト現地経費の負担

各 C/P 機関によるプロジェクト活動経費は本調査時点で以下の通り確保されてきた。年度別予算額の詳細は「付属資料 1：合同評価報告書　ANNEX 2-7」を参照。

- DWSU・DWST　：計 2 億 2,322 万 6,829 円相当[27]　（1,128 万 3,200SDG）
- センナール州 SWC　：計 3,619 万 7,222 円相当[28]　（182 万 9,621SDG）
- 白ナイル州 SWC　：計 3,190 万 6,943 円相当[29]　（161 万 2,765SDG）

３－２　活動実績

プロジェクト活動は活動計画（Plan of Operations：PO）に基づき、概ね計画通りに実施されている。詳細は「付属資料 1：合同評価報告書　ANNEX 3-1」を参照。

３－３　成果の達成状況

本調査時点の各成果の達成状況は以下のとおりである。

[27] 2011 年度～2015 年度 DWST 予算の総額。DWSU から配分された DWST の年度別予算は 2011 年度から 2012 年度に 12%増加、2012 年度から 2013 年度に 82% 増加、2013 年度から 2014 年度に 18%増加した（スーダン政府会計年度は 1 月 1 日に開始、12 月 31 日に終了）。換算レート 19.784 円/SDG（2015 年 2 月 JICA 公式レート）。

[28] 2012 年度～2015 年度センナール州 SWC 研修予算の総額。年度別の推移は、2012 年度から 2013 年度に 57%減少（2012 年はセンター建設費用が含まれていた）、2013 年度から 2014 年度に 36% 増加、2014 年度から 2015 年度 15%増加した。換算レート 19.784 円/SDG（2015 年 2 月 JICA 公式レート）。

[29] 2012 年度～2015 年度白ナイル州 SWC 研修予算の総額。年度別の推移は、2012 年度から 2013 年度 9% 増加、2013 年度から 2014 年度に 150%増加、2014 年度から 2015 年度に 20% 増加している。換算レート 19.784 円/SDG（2015 年 2 月 JICA 公式レート）。

３－３－１　成果１の達成状況

成果１：DWST で中長期人材育成計画に則った研修が実施される。	
指標	達成状況
1-1. 中長期人材育成計画が 2013 年 3 月までに策定される。	・「四半世紀戦略文書（2007-2031 年）」に基づき、DWST は「中長期人材育成計画 2012-2026 年」を作成し、第 2 回 JCC（2012 年 6 月 27 日）で協議の上、同計画は各州 SWC 幹部を含めた JCC 出席者に承認された。 ・ 2015 年 2 月、DWST は同計画最終案を、連邦政府水資源・電力省（Federal Ministry of Water Resources and Electricity：MoWRE）へ提出し、承認待ちである。 ・ 同計画が MoWRE に承認され次第、DWST は連邦政府人材育成省（(Federal) Ministry of Human Resource Development：MoHRD）へ承認申請を行う予定である。
1-2. DWST の研修実施コーディネーターの研修計画立案と実施における貢献度が全体の 100%になる。	・ 2014 年 1 月の中間レビュー時点で、DWST の研修コーディネーターの研修計画立案と実施への貢献度は 100%を達成していることが確認されている[30]。
1-3. DWST において年間 20 コース以上の研修が実施される。	・ DWST は各種研修コースを提供し、年間実施回数は 2011 年に 18 回、2012 年に 21 回、2013 年に 23 回にのぼる。1,143 名の研修生を受け入れた。コース名、参加人数詳細は「付属資料：合同評価報告書」を参照。

成果 1 は上記指標の達成状況に示されるとおり、本調査時点で概ね達成されている。

DWST は MoHRD との協議に基づき、「中長期人材育成計画 2012-2026 年」に国家人材育成戦略のコンセプトを盛り込む形で最終案を策定した。本調査時点で DWST は MoWRE 大臣に最終案を提出し、承認待ちである。プロジェクト期間を通し、DWST は同計画に基づき年間研修計画を策定してきた。また、同長期計画の活動の一つとして示されている、モロッコとの技術交流に関しては、毎年、モロッコ人専門家をスーダンへ招聘するとともに、スーダン側 C/P をモロッコ研修へ派遣してきた。他方、同計画の前提条件に想定されていた新規キロテン研修センターは本調査時点で未完成である。（指標 1-1）

DWST では研修生による各コース内容に係る評価とコメント等を参考に、研修カリキュラム、教材、マニュアル等が更新されており、研修コーディネーターの研修運営管理能力は向上していると言える。（指標 1-2）

新規キロテン研修センターは未完成であるものの、DWST は既存の施設とリソースを活用し、年間研修計画の規模（回数・種類）を毎年拡大し、同計画を実行してきた。フェーズ 1 からの通算で 1,775 名、このうちフェーズ 2 期間中に 1,143 名の研修生を受け入れた。（詳細は下表参

[30] フェーズ 1 で DWST の研修実施体制が構築された際、JICA 専門家は C/P の研修管理能力を定量的に評価する手法を開発した。研修コースの計画と実施に係る 34 種類の必要なステップが抽出され、各研修コースの実施後、C/P 及び JICA 専門家間で、どの程度 C/P が各ステップにおいて貢献したか協議され、ゼロから 100 までで加点評価がされる。34 種類のステップそれぞれに点数がつけられた後、その平均値が貢献度となる。本評価手法は、研修管理における C/P の弱点を発見し、能力開発の進捗を計るために有効な手法として JICA 専門家及び C/P から認識されていることから、フェーズ 2 においても C/P の研修管理能力をモニタリング・評価するための手法として採用されることとなった。

照）（指標 1-3）

DWST はフェーズ 1 とフェーズ 2 を通し 32 コース以上の研修を開発し、30 もの組織から研修生を受け入れている[31]。DWST の研修生の 80%は SWC からの参加者であり、以下の３－３－２に述べるとおり、研修で習得した技術と知識を実際の業務に活用しているケースが本調査でも確認されている。このほか、紛争影響地域（ダルフール各州、南コルドファン州等）で事業を実施している国際連合プロジェクトサービス機関（UNOPS）、国際移住機関（International Organization for Migration : IOM）、アフリカ開発銀行（African Development Bank：AfDB）等も、同地域から 120 名以上の研修生を DWST に派遣してきた。

現在の課題は、「中長期人材育成計画 2012-2026 年」で目標に掲げる「アフリカ地域の中核となる研修センター」を目指し、DWSU と DWST が入手可能な内部及び外部のリソースを活用した上でいかに向上していけるかである。

[31] DWST の研修には、18 の SWCs に加え、ハワタ水公社、N.W.E. company、MoWRE の Groundwater & wadis、南スーダン政府、スーダン大学、ゲジラ大学、Africa city technology、税関局、紅海州海事港湾庁、スーダン造幣局等、多数の機関から派遣されている。

表 3－1　DWST 主催による研修コース名と研修生数（2009～2015 年）

No.	DWST による研修コース	参加者数　（年別）							
		2009	2010	2011	2012	2013	2014	2015	合計
1	浄水場維持管理	41	17	15	29		29		131
2	給水施設	64	18	31	29	52	16	16	226
3	データ管理/GIS	46	27	16	26	31		13	159
5	井戸管理	19	37	17	16		44		133
6	組織管理	12	25			13	16		66
4	水質管理		33	32	29	29	26	14	163
7	配管網管理		35	30	26	54	48		193
8	給水施設管理		39						39
9	上級井戸管理				9				9
10	井戸カメラ				8				8
11	コスト推計・機材管理					9			9
12	アイソトープ水文学			8					8
13	調達・保管/サプライチェーン			13	19	10	10		52
14	井戸設計			16	16	49			81
15	流量測定と表流水			25					25
16	プロジェクトサイクルマネージメント			16	15				31
17	物理探査				26				26
18	プレゼンスキル				15				15
19	指導員研修				13				13
20	報告書作成				11	11			22
21	モニタリング評価計画					18			18
22	井戸改修の経済効果					12			12
23	エンジニアリングエコノミー					14			14
24	太陽光システム					24			24
25	地下水処理・クロマトグラフィー技術					25	27		52
26	PLC 基礎					17			17
27	PC スキル（エクセル）					12			12
28	衛生管理						34		34
29	マネージメントスキル・プロジェクト計画						26		26
30	統合水資源管理・平和構築・紛争解決ワークショップ						25		25
31	統計分析（SPSS）						11		11
32	ウォーターヤード技術管理						18		18
33	地下水・表流水アトラスワークショップ							73	73
34	地方給水開発							14	14
35	年金と保険							16	
合計		182	231	219	287	380	330	146	1,775

３－３－２　成果２の達成状況

成果２：DWST による支援の下、PSWC における研修実施体制が確立される。	
指標	達成状況
2-1. PSWC の研修実施コーディネーターの研修計画立案と実施における貢献度が 80%以上になる。	・ 2012 年に PSWCs が研修センターを開設後、研修コーディネーターは研修計画立案と実施における貢献度(年間平均)を下記の通り年々上昇し、2013 年には 80%以上となった。 ✓ 白ナイル州：64.8%（2012 年)、80.7%（2013 年)、89.1 %（2014 年) ✓ センナール州：69.31%（2012 年)、84.1%（2013 年)、91.2%（2014 年)（センナール州では JICA 専門家の技術支援なしに、独自で 11 コースを独自に提供した）
2-2. SWC 研修計画に基づいた研修の実施。	・ 年間研修計画に基づき、各 PSWC は毎年コース数を増加し、研修を実施してきている。 ✓ 白ナイル州：2012 年 7 コース（全 8 回)、2013 年 8 コース（全 9 回)、2014 年 8 コース（全 12 回） ✓ センナール州：2012 年 6 コース（全 9 回)、2013 年 13 コース（全 17 回)、2014 年 11 コース（全 14 回）

成果 2 は上記指標の達成状況に示されるとおり、本調査時点で既に達成されている。

両パイロット州において、研修コーディネーターは、既存の研修教材を活用し、講師の協力を得て、研修計画及び実施への貢献度を高めてきた。プロジェクト期間を通し、研修生のコース、講師、施設に対する満足度は全般的に高く維持されてきた。フェーズ 1 の期間中に DWST で研修[32]を受けた PSWC スタッフの多くが、研修コーディネーターや講師として、研修センターの運営管理に従事し、活躍していることは特筆に値する。また、コーディネーターの多くが 2012 年から自州の研修センターで研修を実施しており、習得知識と技術を、研修コースの調整業務を含む実務に活かしている。白ナイル州及びセンナール州における研修の詳細は下表に示す。（指標 2-1）

PSWCs は各州で策定された「水・衛生セクター戦略計画 2011-2016 年（Water, Sanitation and Hygiene（WASH）Sector Strategic Plan 2011-2016)」に基づき、業務を実施している。同戦略計画は PSWCs が研修センターの設置を計画する以前に策定された。2012 年に PSWCs に研修センターが開設され、技術及びマネージメント研修が実施された結果、両 PSWCs は同戦略計画における人材育成目標値を大きく上回る形で達成することとなった[33]。また、各 PSWC は今後の研修活動の持続性を確保するため、JICA 専門家の指導の下、研修実施計画を含む「水供給人材育成アクションプラン 2015-2018 年（Action Plan 2015-2018 – Human Resources Development for

[32] 特に水質分析、組織管理、井戸管理、電気・機械・機材管理、データ管理、浄水場管理、配管網管理コース等に参加した SWC 職員は、これらコースのコーディネーターや講師として活躍している。

[33] 「センナール州 WASH 戦略計画 2011-2016 年」では、セクター能力強化活動として（1）全レベルのマネージメントに係る研修：100 名、(2) 全レベルの技術に係る研修：150 名という目標値が掲げられている。「白ナイル州 WASH 戦略計画 2011-2016 年」では、セクター能力強化活動として（1）SWC と州保健省（MoH）職員の WASH に関する研修：120 名、（2）技術に係る研修：150 名という目標値が掲げられている。

Water Supply)」を策定している[34]。（指標 2-2）

表 3－2　白ナイル州水公社における研修の概要

コース名	白ナイル州水公社における研修								
	2012		2013		2014		2015		合計
	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）
組織管理	20	62.1/ 63.6	19	87.9	-	-	28	86.7	39
井戸管理	11	60.0	14	63.0	12	86.7	12	-	37
水質管理	10	66.0	-	-	47	84.0/ 94.0	-	-	57
データ管理	10	61.7	14	87.2	-	-	-	-	24
機材管理	13	65.0	14	86.1	-	-	-	-	27
機械管理	11	67.0	-	-	50	81.0/ 95.7/ 86.1	-	-	61
電気管理	7	73.2	-	-	13	90.6	6	-	26
配管網管理	-	-	17	86.0/ 67.0	14	94.0	-	-	31
浄水場管理	-	-	13	82.6	50	86.3/ 94.3	-	-	63
コミュニティ開発	-	-	17	82.6	17	85.0	12	94.6	46
水道料金管理	-	-	25	84.0	-	-	28	86.7	25
衛生管理	-	-	-	-	19	91.0	-	-	19
研修生数合計/ 平均貢献度率	82	64.8	133	80.7	222	89.1	86	89.3	523

出所：DWST、JICA 専門家提供資料、本調査による質問票回答。

[34] 同アクションプランでは、①人材育成のコンセプト、②給水の課題、人材育成のニーズ、研修対象、③人材育成の実績、④研修実施体制、⑤今後 3 年間の研修計画（研修コース数、研修生数、予算等）が含まれている。出所：Sennar State Water Cooperation Training Center Action Plan (2015-2018) – Human Resources Development for Water Supply (Draft)

表 3-3　センナール州水公社における研修の概要

コース名	センナール州水公社における研修								
	2012		2013		2014		2015		合計
	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）
組織管理	32	59.0/ 100/ 53.0	24	N/A/76.9	-	-	-	-	56
井戸管理	11	65.0	20	64.1/ 91.1	-	-	8	95.9	39
水質管理	5	67.0	-	-	19	82.0/ 94.3	-	-	24
データ管理	10	71.8	9	87.8	-	-	-	-	19
機材管理	10	61.0	7	81.4	7	81.4			24
機械管理	-	-	11	78.0	18	87.5/ 87.5			29
電気管理	-	-	16	86.0/ 100	7	92.4	-		23
配管網管理	-	-	17	67.0/83.5	5	94.0			22
浄水場管理	-	-	12	81.1	19	87.1/ 92.3			31
コミュニティ開発	-	-	15	78.7	12	86.3	11	94.7	38
水道料金管理	-	-	12	87.0	-	-	-	-	12
衛生管理	-	-	-	-	9	92.0			9
コンピュータ基礎	24	100/ 100	-	-	-	-			24
オート CAD	-	-	10	100.0	-	-			10
会計・エクセル	-	-	10	-	-	-			10
政府補助金システム	-	-	11	100.0	-	-			11
政府会計プロセス	-	-	-	-	11	100			11
公共サービス条例	-	-	-	-	12	100			12
GPS	-	-	-		14	100			14
研修生数合計/ 平均貢献度率	92	69.31	174	84.1	133	91.2	19	95.3	418

出所：DWST、JICA 専門家提供資料、本調査による質問票回答。

３－３－３　成果３の達成状況

成果３:PSWC の研修実施と給水施設維持管理のモニタリング体制が DWSU 及び PSWC に確立される。	
指標	**達成状況**
3-1. 2015 年 3 月までにモニタリングマニュアルが作成される。	・ 各 PSWC で選択されたモデルサイト（各 1 セクター/郡）内のウォーターヤードのモニタリング活動を実施し（2014 年 11 月-2015 年 1 月）、その結果をモニタリングマニュアル（案）に反映させた。 ・ 2015 年 1-2 月に両 PSWCs でモニタリングワークショップ開催後、モニタリング評価部/ユニットは以下のモニタリングマニュアルを完成させた。 ✓ “DWSU/DWST Monitoring manual – Human Resources Development (Training). March 2015”（研修用） ✓ “DWSU Monitoring manual – Water Yard. March 2015”（給水施設ウォーターヤード用）
3-2. モニタリング活動が計画通りに実施される。	(1) 研修実施 ・ DWST と PSWCs は年間研修計画に基づき、各研修コースのモニタリングを実施している。

	(2) 給水施設維持管理（ウォーターヤード）[35] ・ 2014-2015 年モニタリング計画に基づき、モニタリング評価ユニットはモデルサイトのモニタリング活動を実施した（2014 年 11 月－2015 年 1 月）。 ✓ 白ナイル州：114 サイト（タンダルティ郡） ✓ センナール州：116 サイト（シンジャ郡） ・ 同計画に従い、両 PSWCs のモニタリング評価ユニットは、残りの郡におけるモニタリング活動（ベースライン調査）を 2015 年末までに実施する予定である。

成果 3 は上記の指標の達成状況に示される通り、本調査時点で概ね達成されている。

成果 3 には、以下のとおり、2 つのコンポーネント（①研修実施のモニタリング、②給水施設の維持管理のモニタリング）が含まれており、郡レベル、州レベル、連邦政府レベル間を繋いだ、包括的なモニタリング実施体制を構築し、監視していくことが想定されている。

(1) 研修実施のモニタリング

DWST 及び PSWCs における研修モニタリングシステムの構築は充分に達成されている。JICA 専門家の指導の下、DWST の研修コーディネーターはモニタリング評価の手法を開発し、これらの手法はフェーズ 2 でも継続的に実践されてきた。同様に、PSWCs でも研修コーディネーターが同手法を導入するとともに、研修データベース（教材、研修生の情報、研修生によるコース評価の結果等を含む）を開発した。また、各 PSWC はモニタリング計画に基づき[36]、蓄積したデータを「研修モニタリング報告書」にとりまとめ、DWST へ共有している。これらの活動実績は、研修モニタリング体制が確立されたことによる効果といえる。今後、DWST は、PSWCs 及び他 SWCs から受け取るデータを体系的に分析し、好事例、研修センター活動の教訓等を取り上げ、関係者に紹介していくことが期待される。

(2) 給水施設（ウォーターヤード）維持管理[37]

2014 年 1 月に実施された中間レビュー以降、DWSU と PSWCs は、給水施設維持管理のモニタリング体制に関する活動を促進した。白ナイル州及びセンナール州で新たに形成されたモニタリング評価ユニットのメンバーは、ウォーターヤード施設機材の状態を確認、記録するために、各種モニタリング様式を開発した[38]。その上で、同メンバーはモニタリング計画[39]、及びモニタリングマニュアルに従い、各施設機材のベースラインデータを収集した。その後、収集データの分析結果をもとに、優先度の高い施設機材の改修計画を策定した[40]。

[35] 各 PSWC のウォーターヤード数は、センナール州で 720 カ所（出所：センナール州 SWC、2015 年 2 月 24 日）、白ナイル州で 372 カ所にのぼる（出所：白ナイル州 SWC、2015 年 3 月 5 日）。

[36] “Sennar SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014.”, “White Nile SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014.”

[37] パイロット州の「水・衛生セクター戦略計画（2011-2016 年）」によると、住民の安全な水使用量は白ナイル州で 25.4（L/人/日）、センナール州で 34.0 （L/人/日）である。両州における地方給水地域の給水量は都市給水に比較して非常に少ないことから、本プロジェクトでは地方給水の主要給水施設である「ウォーターヤード」のモニタリング実施を通し、給水量の少ない地方給水地域の給水事情改善を促進することが、より効果的であると判断した。（出所：JICA 専門家提供資料）

[38] ウォーターヤード施設機材用モニタリング様式は以下の通り各種開発された。(1) ベースライン調査（Baseline survey）、（2）年次調査（Annual survey for SWC monitoring units）、(3) 季節調査（Seasonal survey）、(4) 月次調査（Monthly survey for SWC locality）、(5) 各日記録（Daily recording for operators）。

[39] “Sennar SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014.”, “White Nile SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014.”

[40] 出所：①Sennar SWC Monitoring Follow-up and Evaluation Unit Action Plan – Water Yard Rehabilitation (2015-2016). February 2015. 同計画では、シンジャ郡事務所は 14 のウォーターヤード施設機材の改修を 2015 年 12 月までに実施する予定である。 ②

2015 年末を目途に州全土のベースライン情報の収集活動を完了後、順次、定期的なモニタリング活動を SWC の各郡/セクター事務所と協働で実施する予定である。また、収集データの分析結果を踏まえ、優先する施設機材の改修計画を郡/セクターごとに、順次策定する予定である。

加えて、モニタリングマニュアルに示される通り、PSWCs の同ユニットメンバーは体系的に各郡から収集する情報をデータベース上で更新し、定期的に DWSU 情報センター兼モニタリング評価部へ送付する。最終的に、同モニタリングデータは、全国の給水施設の情報を管理するデータベースに統合される仕組みとなっている[41]。DWSU が今後、同データベースを定期的に更新し、全国の給水計画の形成、及び外部の支援により提供される資機材の分配に活用していくことを意図している。

３－３－４　成果４の達成状況

成果４：DWST による支援の下、その他 SWC における研修実施体制が整備される。	
指標	**達成状況**
4-1. 2015年3月までに人材育成マニュアルが作成される。	・ DWST は人材育成マニュアル（Human resources development manual）の作成を「中長期人材育成計画 2012-2026 年」に沿って実施してきた。 ・ 2015 年 3 月中に、DWST は同マニュアルを最終化し、全ての SWC へ配布予定である。
4-2. PSWC の活動成果共有合同セミナーが 6 回実施される。	・ DWST と SWC は合同セミナーを 2014 年 11 月までに 6 回実施し、PSWCs の活動成果に加え、新規に研修センターを開設した SWC の実績も発表され、共有された。第 7 回合同セミナーを 8-9 月に予定している。

成果 4 は上記の指標に示される通り、本調査時点で概ね達成している。

成果 1、2、3 の結果を踏まえ、DWST は人材育成マニュアルを作成し、本調査時点で最終校正作業を進めている。（指標 4-1）合同セミナーの開催により、多くの州において SWC の C/Ps、及び水・衛生分野の関連省庁、国際機関、ローカル機関関係者間の情報共有が活性化し、モティベーションの向上にも繋がった。（指標 4-2）

フェーズ 1 の開始以降、全 18 州の SWCs のうち、14 州の SWCs が研修センターを設立した[42]。これら州レベルでの実績は、フェーズ 1 から DWST の研修に参加し、フェーズ 2 では合同セミナーに積極的に参加してきた、SWC 幹部職員、及びエンジニアたちのイニシアティブによってもたらされたといえる。各州水公社が実施している研修の実施状況を下表に示す。

White Nile SWC Monitoring Follow-up and Evaluation Unit Action Plan – Water Yard Rehabilitation (2015-2016). February 2015. 同プランでは、白ナイル州 SWC はタンダルティ郡の 10 のウォーターヤード施設機材の改修を計画している。

[41] DWSU 情報センター/モニタリング評価部は 2005 年に UNICEF による支援により開発された「WES インフォメーションシステム」を管理している。同データベースでは、ウォーターヤードに加え、ハンドポンプ、雨水貯水池/ダム、開放井戸、浄水場、衛生、研修、学校給水/衛生、改修/維持管理等の項目別のデータが含まれている。UNICEF スーダン事務所によると、「WES インフォメーションシステム」を、今後、保健分野の項目を追加し「WASH インフォメーションシステム」にアップグレードする計画である。

[42] 主にスーダン側の資金で建設されている。3 件（南コルドファン州、西ダルフール州、南ダルフール州）は UNICEF 支援による。うち 2 件（青ナイル州、紅海州は施設改修中）。別途、1 件（西コルドファン州）は新規開設予定に向け既存の建物を改修中。

本プロジェクトでは、これらの新規研修センターへ研修機材の供与を行った[43]。また、DWSTは研修運営管理、教材、講師の紹介等に係る技術アドバイスのほか、水質検査ラボ及びコンピュータラボの設置支援を行った。直近では、両 PSWCs が北コルドファン州研修センターを訪問し、同センター職員向けにワークショップを開催し、PSWCs で構築した研修運営管理システムに関する紹介を行った。これらの異なる州間の技術交換は、プロジェクトの合同セミナー、合同調整委員会（Joint Coordination Committee：JCC）会議、スタディツアー、モロッコ研修、DWST での研修等を機会として、活性化された。

表 3－4　各州水公社における研修実施状況

SWC（DWST 研修への参加者数 2008-2014 年）	研修施設 ◎設置済, ▲改修中, ×未定	2014 年の研修		予算(SDG)*		備考（2015 年計画等）
		実施コース数	研修生数	2014 年	2015 年 (計画)	
北部州 (60)	◎	7	104	432,360	425,680	・2015 年計画：15 コース
ナイル州 (76)	◎	7	96	166,063	140,000	・2015 年計画：7 コース
ゲジラ州 (91)	◎	18	302	361,400	542,100	・研修センター建設費用：1,479,550 SDG ・2015 年計画：ワークショップの改修、19 コース
ガダレフ州 (60)	◎	-	-	15,000	250,000	・2015 年計画:エンジニア､顧客サービス､作業者向け研修
カッサラ州 (82)	◎	1	14	-	350,000	・2014 年：財務研修 ・2015 年計画：155 名
紅海州 (40)	▲	1	20	35,000	10,000-	・既存研修センターを改修中。
青ナイル州 (74)	▲	2	-	-	-	・2014 年：給水場の維持管理、ウォーターヤード管理 ・2015 年計画：4 コース
北コルドファン州 (65)	◎	25	516	95,000	528,212	・2015 年計画:39 コース（対象:1,380 名）、
南コルドファン州 (153)	◎	-	-	-	-	
西コルドファン州 (17)	▲	-	-	-	-	・新規開設に向け、既存の建物を改修中。
南ダルフール州 (124)	◎	0	0	-	-	・2015－2016 計画：OJT（UNICEF 支援）、5 コース
西ダルフール州 (119)	◎	1	30	20,000	60,000	・2015 年計画：9 コース
東ダルフール州 (35)	×	-	-	-	-	・研修センター設置未定
中央ダルフール州 (44)	×	-	-	72,000	210,800	・研修センター設置未定であるが、以下の研修を実施、計画との情報有り。 ・2014 年実績： 7 コース、245 名。 ・2015 年計画：13 コース、587 名。
北ダルフール州 (108)	◎	1	30	100,000	700,000	・2015 年計画：TOT 125 名
ハルツーム州 (38)	◎	-	-	-	-	・ハルツーム州所有の研修センターはないが、DWST の所在地はハルツーム市内である。

[43] Annex 2-5 に示すとおり、本プロジェクトにより、研修機材は北部州、リバーナイル州、ゲジラ州、ガダレフ州、紅海州、北コルドファン州の SWC に供与された。DWST センター長は、研修センター施設の基本的な必要設備、研修センターのマネージメントに関する技術ガイダンスを行った。

３－４　プロジェクト目標の達成状況

本調査時点のプロジェクト目標達成状況は以下の通りである。

プロジェクト目標：スーダンにおいて給水人材が適切に育成される。	
指標	達成状況
1. スーダンにおける研修生の数が2000人以上となる。	・プロジェクト期間中（2012～2015年とした場合）にDWST及び各州水公社が実施した研修では、合計3,196名以上の研修生を受け入れた。 ✓ DWST：計1,143名（2012～2015年） ✓ センナール州：計418名（2012～2015年） ✓ 白ナイル州：計523名（2012～2015年） ✓ パイロット州以外の州:計1,112名（2014年のみ。2012～2013年、2015年はデータ不明）
2. 各パイロット州で年間に修繕されるウォーターヤードの数が20件以上となる。	・各パイロット州で、4年次に修繕されたウォーターヤード（ポンプ、コントロールパネル、ジェネレーター、井戸改修、ウォータータップ、高架タンク、パイプ、その他）の件数は以下の通り20件を超えている。 ✓ センナール州：32サイト（57アイテム）（7郡中6郡の情報[44]）（期間：2014年10月1日-2015年2月2日） ✓ 白ナイル州：48サイト（85アイテム）（8郡中3郡の情報[45]）（期間：2014年10月2日-2015年2月20日）

プロジェクト目標は上記の指標の達成状況に示される通り、本調査時点で既に達成されている。

近年のスーダンの経済状況の悪化に伴う連邦政府の予算削減にも関わらず[46]、DWST及び両PSWCsは、安定した研修予算を確保し、より多くの研修生を迎え、より多様なコースを提供する等、その研修実施能力を高めてきた。これは、水供給事業に係る人材育成に対するDWSU及びPSWCsの高いコミットメントを象徴している。（指標1）給水施設の維持管理に関し、PSWCsの郡/セクター職員はコミュニティにおける給水施設の改修にオンザジョブ・トレーニング（On the Job Training：OJT）で取り組んだ[47]。研修コース以外でも、これらの研修を受けたエンジニア、技術者達は、既存の機材や道具を使い、給水施設改修と維持管理を実施している。加えて、上述の「成果3」の項で述べたとおり、シンジャ郡事務所は、モニタリング結果に基づきウォーターヤード施設の改修計画を実行に移している。（指標2）

３－５　上位目標の達成見込み

上位目標の達成状況見込みに関し、確認されたのは以下の通り。

[44] センナール州の全7郡中、本調査時点で6郡から情報提供があった。
[45] 白ナイル州の全8郡中、本調査時点で3郡から情報提供があった。
[46] 2011年の南部スーダン分離に伴い、スーダン経済は75%の石油収入を失い、経済不況に陥った。これに伴い、スーダン政府は2012年より緊縮経済政策を施行している。GDP成長率は、マイナス3%（2011年）、マイナス10%（2012年）、マイナス6%（2013年）低迷しており、インフレ率（消費者物価）も依然高い状態が続いている（2011年22%、2012年37%、2013年29%）（出所：世界銀行World Development Indicators）。かかる状況下、2012年以降、他の省庁同様、DWSUも財政状況は困窮を極め、連邦財務省からの拠出は申請予算額の約50%強である。（DWSU聞取り）
[47] 特に、井戸管理、電気・機械・機材管理コースではOJTがコースプログラムに組み込まれている。

上位目標：スーダンにおいて給水施設が適切に維持管理されるようになる。	
指標	達成状況
1. SWC スタッフが彼らの知識や技術を活用し、給水施設の運営維持管理を行う。	・ パイロット 2 州では、DWST の研修、PSWC 研修センターの研修、第三国研修[48]に参加した職員は、習得技術や知識を郡での給水施設維持管理にかかる実務に活用している。いくつかの好事例を以下に示す。 ✓ 井戸管理、電気・機械・機材管理、配管網管理コースに参加した研修生は、深井戸（エアーリフト作業)、ポンプ、コントロールパネル、ジェネレーター、高架タンク、パイプ等の修繕を、コースの実習中及び、実務でも実施している。 ✓ コミュニティ開発の研修生は、研修中にウォーターヤード周辺環境の改修を行った。 ✓ 配管網管理コースに参加した職員は、配管修繕の他、配管網の設計を実務で行っている。 ✓ 水質管理コースに参加した職員は、水質分析データベースを改善し、浄水場及びウォーターヤードの水質検査結果をコンピュータ上で管理し、データベース上リンクされた様式を用いて、検査報告書を発行している。 ✓ データベース管理コース、GIS/リモートセンシングコースに参加した職員は、各種データベース（給水施設管理、修繕ニーズの警報システム、給水施設運転時の電気消費、顧客情報・電気消費、職員データ、給与・報酬データ等）を開発し、郡/セクター事務所のマネージメントの向上を図っている。

上位目標の指標はプロジェクト期間終了から 3 年から 5 年後、パイロット州を含むいくつかの州では、一定程度まで達成されることが推察される。

「プロジェクト目標の達成」の項で述べたとおり、プロジェクト目標は既に達成している。プロジェクト効果の継続については DWSU 及び DWST、各 SWC が如何に給水施設にかかるモニタリング体制とシステムを導入し、定着できるかにかかっている。しかしながら、スーダンの広大な土地には多数の給水施設が存在し、その種類も、浄水場、ウォーターヤード、緩速砂ろ過池、ハンドポンプ、堀井戸、小規模ダム、雨水用貯水池等、多岐にわたって存在することから、かなりの年数を要すると見込まれる。

他方、上位目標を達成する為の外部条件として、1）研修コースの履修を終えた多くの PSWC 職員が離職しない、2）給水施設の運転に影響を与える気候の変化や天災が起こらない、3）SWC に必要とされる予算、人材、機材が適切なタイミングで投入されることが掲げられており、今後も留意が必要である。

[48] SWCs の複数の職員はモロッコ研修や GIS 研修（JICA エチオピア）に参加している。

３－６　プロジェクトの実施プロセスにおける特記事項

３－６－１　貢献要因

(1)　能力開発アプローチ

1)　フェーズ 1 で開発された経験、知見、成果品の有効活用

「成果 2 の達成状況」の項で述べたとおり、パイロット州の研修コーディネーターは、フェーズ 1 で DWST において開発された、研修の評価手法を含む研修運営管理フローに沿って活動を実施してきた。加えて、フェーズ 1 では、DWST は研修コストを分析し、研修予算計画様式を作成した。同手法と様式は、フェーズ 2 においてもパイロット州や新規研修センターを開設した他州でも活用されている。PSWCs 研修センターは 2012 年の開設から 1 年後には、正確な予算計画策定と計画に基づく拠出を適時に行えるようになった。

2)　研修生への表彰制度

フェーズ 1 より、DWST 及びパイロット州水公社は、研修終了時の試験結果の良い研修生を対象に、特別な認定証を発行しており、研修生のプロジェクト活動への積極的な参加に結びついた。

3)　SWC 研修センター間の講師派遣、研修生受入による技術交流

DWST と SWCs はスーダン国内の人的資源を動員することで、異なる州間の技術移転をよりダイナミックに調整することが可能となった。フェーズ 1 より、カッサラ州やゲジラ州の SWC 職員は、DWST や PSWCs が実施する研修講師として派遣され、州を超えた技術交流に貢献してきた[49]。フェーズ 2 では、カッサラ州 SWC は、3 名の職員をパイロット州で初めて実施された井戸管理コースの講師として派遣し、1 つ目の井戸の改修を指導した。2 つ目の井戸改修時には、研修を受けた PSWC 職員が半分残り、新たに加わった研修生を指導した。井戸管理研修ではこの方法を繰り返すことで、PSWCs の各種専門分野の異なる職員（電気エンジニア、機械エンジニア、地質学者等）への技術移転を展開することができた。

4)　合同セミナー及びスタディツアー

DWST 及び PSWCs で実施される研修に限らず、各州で開催された合同セミナー及びスタディツアーを通し、多様な州からの参加者は情報共有及び意見交換の機会を得ることができた[50]。

5)　モロッコ第三国研修及びモロッコ人専門家招聘

スーダン人 C/P のモロッコ第三国研修への派遣、モロッコ人専門家のスーダンへの招聘による相乗効果が両国の関係者間で見られた。モロッコ側受入機関は、通常はフランス語で研修実施を行っていたが、スーダン人 C/P に対する研修では、初めてアラビア語で研修を行ったことで、北アフリカ地域の第三国研修受入国としての経験値が高まった。

[49] カッサラ州 SWC 職員は水道料金、物理探査（2D Geo-Electrical Imaging）、井戸管理等の研修コースの指導を行った。ゲジラ州 SWC 職員はデータベース管理研修をセンナール SWC 研修センターで指導した。

[50] PSWCs によるスタディツアーでは研修生は、カッサラ州、ガダレフ州、ゲジラ州の浄水場を視察した。

6） 他の JICA 技術協力プロジェクト及びプログラムとの連携

給水分野[51]及び保健医療分野[52]における他の JICA 技術協力プロジェクトとの連携により相乗効果が現れた。センナール州では SWC 研修センターによる井戸管理研修を通し、給水状況に問題があった「フロントライン母子保健強化プロジェクト・フェーズ 2」の対象病院の井戸改修を行った。また、青年海外協力隊（JOCV、職種：電気/電子）の協力を得て、PSWCs で研修コースが実施された。

このほか、本プロジェクトでは、無償資金協力「コスティ給水施設改善計画」との相乗効果を得るため、同協力により建設予定の浄水場の運転・維持管理に従事する予定の C/P を対象に、白ナイル SWC 研修センターと本プロジェクトの JICA 専門家の協働でコスティ特別研修（機械、機材、電気管理）が実施された。

(2) プロジェクトの管理体制

C/Ps と JICA 専門家は JCC 会議、合同セミナー、総裁（Director General：DG）定例会議[53]等の各種会合を通し、関係者間のコミュニケーションを活発に行ってきた。加えて、フェーズ 1 で構築された JICA 専門家と C/Ps との信頼関係は、フェーズ 2 でも良好に保たれた。更に、C/Ps のチームワークは本プロジェクトを通し強化され、より円滑なプロジェクト運営管理が実現した。

(3) 適切な C/P の配置

DWSU、DWST、SWCs は適切な、人数、職位、能力の C/P を配置した。特にフェーズ 1 において DWST の研修により育成された人材が、SWC の研修センター長、講師、コーディネーター（水質検査、組織管理、井戸管理、電気/機械/機材管理、データ管理、浄水場管理、配管網管理）として研修センター運営管理に大きな役割を果たしている。

(4) DWSU、DWST、SWC における本プロジェクトの高い認知度及び活動への参画

フェーズ 1 とフェーズ 2 を通し、DWSU 及び DWST 職員の間で、本プロジェクトの認知度は高まった。また、「プロジェクト目標の達成」の項で述べたとおり、14 の SWC による新規研修センターの設置、JCC 及び合同セミナーへの積極的な参加にも現れているとおり、SWC 職員の間でも本プロジェクトの認知度は高いと言える。フェーズ 1 において、DWST が実施した研修コースの対象者は、SWC の幹部及びエンジニアが中心であった。フェーズ 2 に入り、各 SWC が研修センターを設置すると、当時の研修生はセンター長やコーディネーター等の要職に就き、なかには SWC の DG 職に就任するものもおり、上記（2）に述べたとおり、円滑なプロジェクト運営管理に貢献した。

(5) 他機関ステークホルダーの参画

研修活動、合同セミナーを通じ、SWC 以外の他機関の職員がプロジェクト活動に参画し

[51] 「カッサラ州基本行政サービス向上による復興支援プロジェクト」（Capacity development project for the provision of services for basic human needs in Kassala）（2011 年 5 月-2015 年 4 月）、「ダルフール及び暫定統治三地域プロジェクト」（Project for Human Resources Development for Darfur and the Three Protocol Areas）（2009 年 5 月-2013 年 6 月）

[52] 「フロントライン母子保健強化プロジェクト・フェーズ 2」（Frontline maternal and child health empowerment project phase 2）（2011 年 9 月-2014 年 9 月）はセンナール州で実施された。

[53] JCC 会議については、「付属資料 1：合同評価報告書　ANNEX3-1」を参照。

た。国際機関（UNICEF、UNOPS、IOM、AfDB）についても DWST の提供する研修コースを通じ、水と衛生分野の人材育成における連携が促進された。

３－６－２　阻害要因

(1)　実施プロセスに関すること（成果 1、成果 3 に係るスーダン側の投入の遅延）

成果 2 及び成果 4 に関連するプロジェクト活動は概ね当初の PO に沿って実施された。他方、成果 1 に関連する DWST の拡張を目的とした新規キロテン研修センターの建設は、本調査時点でも開始されていない。また、成果 3 の前提となる、DWSU 及び PSWCs におけるモニタリング評価部/ユニットの設置は 3 年次まで遅れることとなった。2011 年 12 月に連邦政府灌漑・水資源省が水資源省へ改編し、その後、2012 年 7 月に水資源・電力省へ改編したことを受け、国営水公社は DWSU に改編された。このような状況下、DWSU によるモニタリング評価部の設置も遅れる結果となった。

３－６－３　中間レビュー調査時の提言に対する取り組みの進捗

中間レビュー調査団は、残されたプロジェクト期間の円滑なプロジェクト実施の仕組みと活動環境を整備すべく、以下 4 項目の提言を行った。これらの提言への対応状況は以下のとおり確認された。

(1)　新規キロテン研修センターの建設

本プロジェクトの成果を最大限に創出し、給水分野のより多くの人材に DWST での研修機会が与えられるようにするためにも、新規キロテン研修センターの建設は不可欠である。DWSU は資金面及び契約面の問題を解決すべく、借款協力を行うドナーとの協議を重ねてきた。しかし、同センターの建設は本調査時点で開始しておらず、本プロジェクト期間中の完成の見込みは低いといえる。

(2)　DWSU による衛生管理の専門家の配置

2014 年 6 月に DWST に衛生管理コーディネーターが新規に採用され、配置された。同職員は、研修コーディネーターとして、DWST での衛生管理研修を計画し、調整を行った。連邦政府保健省（(Federal) Ministry of Health：MoH）と MoWRE は水と衛生に係る役割分担について協議した。その結果、DWSU と SWC の役割は水のプロバイダーとして、給水施設の衛生環境の整備を管理する。一方、MoH の役割は、水のエンドユーザー側の保健衛生に関する認識を向上させるという結論に至った。

(3)　モニタリングユニットの設置

中間レビュー後、DWSU 及び SWC はそれぞれモニタリング評価部/ユニットを形成し、適切な人員を配置した。同ユニットの設置の遅延により、成果 3 の給水施設のモニタリング活動は中間レビュー後に本格始動した。限られたプロジェクト期間、及び投入（人員、機材、車両）にも関わらず、「成果 3 の達成状況」の項で述べたとおり、両パイロット州のモニタリング評価ユニットは、モデルサイトとして選択した郡に点在する給水施設のモニタリング活動（ベースライン調査）を完了することができた。

(4)　各 SWC のビジネスマインド及び管理能力の開発

各 SWC ではビジネスマインド及び管理能力の開発に関する好事例が以下の通り確認されている。

1)　データベースの導入によるマネージメントの向上（センナール州、ゲジラ州）

「上位目標の達成」の項で述べたとおり、センナール州シンジャ郡/セクター事務所では、所長がゲジラ州 SWC 研修センターのコンピュータエンジニアの技術協力の下、多様なデータベースを開発し、セクター事務所のマネージメント能力の向上を図っている。これらのデータベースを活用し、同事務所では顧客による電気消費量、給水施設の運転にかかる電気消費量の状況と傾向[54]、不具合がある施設、設備の情報について管理している。その結果、より効率的な水道料金徴収管理に加え、給水施設の適切な運転時間管理とタイムリーな維持管理・改修を行うことで、コスト削減に繋がっている。

ゲジラ州 SWC では、州都のメダニ郡（Greater Medani）において、同データベースシステムを試行導入しており、研修センターのコンピュータラボで、当該事務所スタッフを対象とした使用方法に関する研修を実施している。ゲジラ州 SWC では、近い将来、これらのデータベースを全ての SWC 郡事務所に導入し、マネージメントの向上に役立てることを目指している。

2)　研修施設機材を活用した収入向上活動（北部州）

北部州 SWC では研修センター長が、財源の確保を目指し、既存の施設と機材を活用した車両整備サービス、職業訓練の提供に取り組んでいる。

3)　会計、財務を含む運営管理コースの提供（DWST）

DWST では SWC 職員の運営管理能力の強化を目的とした、会計、財務の項目を含む、運営管理研修を提供している。

[54] センナール州では、水道料金の徴収は電気代とともにプリペイド制度で徴収されている（National Electricity Corporation pre-paid digital collection system）。

第４章　評価結果

各評価項目は５段階（高い、やや高い、中程度、やや低い、低い）で判断された。

４－１　妥当性

プロジェクトの妥当性は高いと評価される。

本プロジェクトは、以下に述べるスーダン政府の開発政策及び日本の対スーダン援助政策、技術の優位性、プロジェクトデザイン、ターゲットグループの選択との整合性があることが確認された。

４－１－１　スーダンにおける政策との整合性

- 「スーダン暫定貧困削減戦略文書（Interim Poverty Reduction Strategy Paper : IPRSP）2013年」では、スーダンの安全な給水を妨げている課題として、1）不適切なセクター政策、計画、実施、調整、2）保全、水質、モニタリングへの投資不足、3）給水及び衛生に関するコミュニティの認識不足、4）介入の持続性に係る不十分な記録等が挙げられている[55]。これら課題はDWSU及びDWST、SWCsが取り組むべき責務であるとの認識の下、スーダン政府は連邦政府、州政府、コミュニティレベルの水・衛生分野のパートナーの能力強化、及びコミュニティのエンパワメントを目指す研修事業を優先事項に掲げている。
- 「四半世紀給水戦略計画（Quarter Century Strategic Plan for Water Supply）2007-2031年」においてスーダン政府は全ての国民に対する安全な水の供給を目標に掲げている[56]。「水・衛生セクター政策（Water Sanitation and Hygiene sector policy）2010年」に基づき、連邦政府及び各州政府は「水・衛生セクター戦略計画（Water Sanitation and Hygiene Sector Strategic Plan）2011-2016年」を策定し、安全な水へのアクセスの向上を目指している。

４－１－２　プロジェクトデザインとの整合性

- フェーズ1の終了時、州レベルの水供給人材の更なる育成は残された課題であった。本プロジェクトではこのニーズを踏まえ、成果1、2、4により、連邦レベルと州レベルの研修実施体制を強化し、人材育成を図る枠組みとなっている。更に、成果3を通し、研修実施のモニタリングに加え、郡、州、連邦を結び、給水施設維持管理のモニタリング体制を構築するアプローチとなっている。

[55] 出所：国際通貨基金「スーダン暫定貧困削減戦略文書（IPRSP）（2013年）」（P. 46）。スーダン政府の基本的な目標値として、水使用量を都市部で90（L/人/日）、地方部で20（L/人/日）を設定している。また、ミレニアム開発目標として、2015年までに安全な水へのアクセス人口を82%、安全な衛生施設へのアクセス人口を67%とすることを掲げている。IPRSPは「5カ年開発計画（2012-2016年）」及び、南北スーダン分離による新たな経済環境の課題に対し、経済安定の維持と確保を図るために打ち出された「3カ年緊急プログラム（2012－2014年）」の実施の促進を意図している。

[56] 出所：Ministry of Irrigation and Water Resources. National Water Corporation. (2008). Quarter Century Strategy for Water Supply: First phase programme 2007-2011. (P. 2) 安全な水へのアクセスを地方部で20-50 L/C/day以上、都市部で150 L/C/day以上とすることを目標に掲げている。

４－１－３　対象機関およびターゲットグループのニーズとの整合性

・ 本プロジェクトでは全 18 州を対象とし、その中で白ナイル州とセンナール州の 2 州をパイロット州として選択した。両州は隣接しているため、プロジェクト活動において移動の面で優位性があると共に、以下に示す通り、他の JICA 事業との連携による相乗効果が得られたことから、パイロット州に選定したことは適切であった。第 3 章の「３－６　プロジェクトの実施における特記事項」の「３－６－１　貢献要因 (6)」の項で述べたとおり、カッサラ州、ダルフール州、南コルドファン州、青ナイル州の給水分野の支援、センナール州の保健分野の支援を含む JICA 技術協力プロジェクト、及び、白ナイル州、カッサラ州における給水施設の整備を行う無償資金協力との連携を通し、期待された相乗効果が得られている。

４－１－４　日本の援助政策との整合性

・ 日本の対スーダン国別援助方針（2012 年 12 月）及び事業展開計画（2014 年 4 月）では、平和の定着を推進するとともに基礎生活の向上及び貧困削減を図ることを基本方針に掲げており、水と衛生の施設整備及び維持管理能力の強化は主要な開発課題の一つである。本プロジェクトは協力プログラム「水・衛生支援プログラム」に位置づけられ、都市部及び農村部における水・衛生施設整備及び維持管理能力強化を行い、水・衛生行政の向上を図るものである。

４－１－５　日本の給水分野における技術の優位性

・ 日本によるスーダンの給水分野に対する支援は 70 年代から開始されており、その経験の蓄積から、給水施設の改修等の専門性が活かされている。加えて、本プロジェクトでは、JICA が 80 年代から支援を実施し、発展を遂げてきたモロッコの給水分野の人材や経験を活用している。

４－２　有効性

プロジェクトの有効性は高いと判断される。

４－２－１　プロジェクト目標及び成果の達成見込みと因果関係

・ 第 3 章の「３－４　プロジェクト目標の達成状況」で述べたとおり、プロジェクト目標の達成度は高い。研修生数の増加は、成果 1、2、4 において、DWST、PSWCs、SWCs の連携により強化された研修実施体制に起因するものである。また、成果 1 及び 2 を通じ、研修を受けたエンジニア、オペレーター、テクニシャンは、習得技術と知識を活用して給水施設の維持管理にあたり、年間維持管理件数の増加に貢献した。
・ 成果 3 では、モニタリング体制を確立することにより、給水施設の維持管理が向上することが期待されているものの、プロジェクト目標との直接的な因果関係は弱い（どちらかというと上位目標に関係する）といえる。

４－２－２　阻害要因

・ PDM 上、前提条件として「政治的混乱が発生しない」が設定されている。他方、ダルフール地域、南コルドファン州、青ナイル州における治安情勢は依然不安定である。DWST スタッフ及び JICA 専門家のこれらの地域への渡航制限により、本プロジェクトが現場での技術支援を行うことが阻害されていることから、プロジェクト効果の全国的波及には限界があると危惧された。しかし、このような状況を踏まえ、DWST と PSWCs は通常研修の提供のほか、特別研修を計画し、これら地域からの研修生を受け入れることで、技術移転を実施してきた。

４－２－３　貢献要因（他の JICA プロジェクト、及びスキームの教訓の活用）

・ モロッコ第三国研修、モロッコ人専門家のスーダンへの派遣は、水供給人材育成分野におけるスーダンとモロッコの技術交流のイニシアティブとなった。JICA は 80 年代よりモロッコにおける給水セクターの技術協力を実施してきた。同国では、給水分野の適切な政策、戦略、法制度の整備、コミュニティの包摂を実施し顕著な発展を遂げたことから、スーダン側 C/Ps にとってより身近なモデル国である。
・ 「カッサラ州基本行政サービス向上による復興支援プロジェクト」を通じ、JICA 専門家から技術移転を受けたカッサラ州 SWC 職員は、本プロジェクトでは、DWST 及び PSWCs が実施した研修コース（井戸管理、水道管理、都市給水、物理探査等）に講師として派遣された。これにより、国内の人材を活用した、より効果的な技術移転が実現した。

４－３　効率性

プロジェクトの効率性はやや高いと判断される。

４－３－１　各成果の達成状況

・ 第 3 章の「３－３　成果の達成状況」の項で述べたとおり、本調査時点で全ての成果は概ね達成されている。活動における投入に関し、日本側の投入は、専門家の人数、専門分野、派遣タイミング、供与機材の調達等は、内容も適切であり計画通りに行われた。DWST 及び SWCs は本プロジェクトにより供与された研修用機材を、プロジェクト活動で活用している。スーダン側の投入に関しては、厳しい財政事情にも関わらず、DWST 及び PSWCs は年間の研修予算からプロジェクト活動にかかる必要経費を支出しており、プロジェクト事務所、研修施設、計画された活動の運営費用を提供してきた。成果 1、2、4 の活動を実施する上で、C/P 及び運営スタッフは適時適切に配置されてきた。
・ しかし、成果 1 に係るスーダン側の投入の遅れ（キロテン研修センター建設）、及び成果 3 に係る人員配置の遅れは、効率性を下げる要因となった。詳細は、以下４－３－２（2）に示す。

４－３－２　成果達成への貢献要因、阻害要因

(1)　貢献要因

＜DWST の研修から得た経験の活用＞

・ 第 3 章「３－６－１　貢献要因」で述べたとおり、フェーズ 1 では、研修生数を限定し、同じ研修生が繰り返し研修を受講することを重視した。これらの人材は、フェーズ 2 でパイロット州及び他州 SWCs にて、研修コーディネーター、講師、研修センター長として活躍している。DWST で得た研修経験と技能を踏まえ、PSWCs の研修センター職員は、研修運営管理サイクルに柔軟に適応してきた。

＜技術コースの OJT＞

・ 第 3 章「３－４　プロジェクト目標の達成状況」で述べたとおり、PSWCs では井戸管理、電気、機材、機械管理等の技術コースに OJT 手法を適用し、実用的な給水施設の維持管理にかかる技術移転を徹底した。

＜ステークホルダー間の連携＞

・ 本プロジェクトは DWST、SWCs、他の JICA プロジェクトとの連携により、より効率的に運営管理された。具体的には、モロッコ第三国研修、各州の浄水場への視察のほか、SWC 職員を講師として招聘した DWST 及び PSWCs における研修コース等が挙げられる。

・ DWST は紛争影響地域で給水支援事業を実施する国際機関に対し、研修コースを提供し、連携することで、全国の給水人材の育成に貢献してきた。

(2)　阻害要因

＜成果 1 にかかるスーダン側の投入の遅れ＞

・ 第 3 章「３－６　プロジェクトの実施プロセスにおける特記事項」で述べたとおり、新規キロテン研修センターは収容規模の拡大を想定した設計となっており、その建設の遅延により、成果 1 の活動内容は修正することとなった。しかし、DWST は既存の施設において研修を継続して実施しており、前年よりも研修回数・コース数を増加し、計画どおり運営管理するよう努めている。

＜成果 3 にかかるスーダン側の人員配置の遅れ＞

・ モニタリングユニットの設置の遅れにより、成果 3 の給水施設のモニタリング活動の開始が遅れることとなった。これまでに、研修実施モニタリングと給水施設モニタリングの各種マニュアルと様式が開発されたものの、職員、車両、機材（水位計、EC メーター等）が限られているため、PSWCs モニタリング評価ユニットは、研修コースの実施と並行して州全土で給水施設のモニタリングを展開することは時間を要すると認識している。今後、PSWCs は郡/セクター事務所のオペレーターとともに、継続的なモニタリングシステムに対応していくことが求められおり、僻地にある多くの給水施設を、全てモニタリングしていくためには、より多くの人員の投入が不可欠と見なされている。

４－３－３　成果達成のための外部条件

PDM に設定されている外部条件は成果の達成に正負の影響をもたらしている。

・ 第 3 章「３－４　プロジェクト目標の達成状況」に述べたとおり、スーダン政府による緊縮財政、そして高いインフレ率にもかかわらず、DWST と PSWCs は本プロジェクト期間中、継続して年間研修予算を確保してきた。

- DWSU の管轄省の組織改編が 2011 年（灌漑・水資源省から水資源省）、2012 年 7 月（水資源・電力省）に行われた。2013 年に国営水公社は、飲料水衛生局（DWSU）へ改編した。衛生分野を含むことになった点では組織にとって正の要素といえる。
- フェーズ 1 で DWST に勤務していた研修コーディネーターの何人かは退職してしまったものの、既存の職員と新たに採用された職員が協働で研修を実施してきた。一方、PSWCs では研修センター設立以来、ほぼ同じ職員が継続して業務に従事している。
- DWSU、DWST、PSWCs はプロジェクト活動に必要な予算、人員、必要な機材を提供してきた。

４－４　インパクト

プロジェクトのインパクトは中程度である。

プロジェクト期間終了から 3 年から 5 年後に上位目標が達成されるのは難しいと考えられる。他方、いくつかの顕著な正のインパクトが発現している。

４－４－１　上位目標の達成見込み

- 「スーダンにおいて給水施設が適切に維持管理されるようになる」ためには、プロジェクト目標（給水人材育成）が維持された上で、外部条件（財政面、組織面、施設及び機材の整備、治安情勢等の政治・社会面）が満たされる必要がある。加えて、モニタリングシステムが全州で導入され、全国の既存の給水施設の維持管理情報を把握することが前提となる。このように、複数の外部条件に影響を受ける上、給水システムのマネージメントを向上するために要する年数を考慮すると、上位目標の設定に課題があり、「インパクト」を判断する上でマイナスの要因となった。

４－４－２　組織面へのインパクト

- 2008 年の設立以来、DWST は職員の継続的な努力の結果、給水分野の研修センターとしての認知度を向上させてきた。特に、スーダン国内機関、及び国際機関からの研修依頼は年々増加している。また、研修参加者は、SWCs に限らず研究機関や大学等、多様な組織から派遣されており、顧客のニーズも多様化している。
- 本プロジェクトの開始以前は、多くの SWCs は研修センターを設置していなかった。本プロジェクトの実施から刺激を受けた各州の SWC が、自助努力で研修センターを開設した結果、現在では DWST のほか、14 州で研修センターが設置されている。

４－５　持続性

プロジェクトの持続性はやや高いと評価される。

４－５－１　制度・政策面

本プロジェクトの制度・政策面の持続性は高いといえる。

- 「４－１　妥当性」の項で述べたとおり、スーダン政府における給水分野の関連制度、政策面に変更はなく、当該分野の重要性と人材育成の重要性は維持されるであろう。既存の

州政府の戦略は継続的なモニタリングデータに基づき作成されたものではなかったため、本プロジェクトにおいて、PSWCs はモニタリング結果に基づいて、給水施設改修実施計画を作成した。DWSU と DWST、PSWCs は連邦及び州の政策を踏まえ、現場のニーズに合致した、より実現可能な期間と投入に基づいた各種計画を以下のとおり策定した。

種類	組織	策定された関連する計画
(1) 人材育成	DWSU/ DWST	中長期人材計画 2012-2026 年（2015 年 3 月）
	センナール州 SWC	センナール州水公社研修センター　アクションプラン 2015-2018 年
	白ナイル州 SWC	白ナイル州水公社研修センター　アクションプラン 2015-2018 年
(2) 給水施設維持管理	センナール州 SWC	センナール州水公社　モニタリングフォローアップ評価ユニット　ウォーターヤード改修アクションプラン 2015-2016 年（2015 年 2 月）
	白ナイル州 SWC	白ナイル州水公社　モニタリング評価ユニット　ウォーターヤード改修アクションプラン 2015-2016 年（2015 年 2 月）
(3) モニタリング（研修、ウォーターヤード維持管理）	センナール州 SWC	センナール州水公社　人材育成（研修）モニタリング計画 2014-2015 年（2014 年 11 月）
		センナール州水公社　給水施設（ウォーターヤード）モニタリング計画（2014 年 11 月）
	白ナイル州 SWC	白ナイル州水公社人材育成（研修）モニタリング計画 2014-2015 年（2014 年 11 月）
		白ナイル州水公社　給水施設（ウォーターヤード）モニタリング計画（2014 年 11 月）

４－５－２　組織面

本プロジェクトの組織面の持続性は高い。

(1)　研修センターによる人材育成

- 「中長期人材育成計画（2012－2026 年）」が MoHRD に確実に承認されることで、DWSU 及び DWST はプロジェクト効果の持続性を高めることが期待される。また、総務管理を改善し、研修した職員を長期間組織内に留保していく上でも、本計画を実現することが不可欠である。
- 両 PSWCs は研修センター活動を継続し、拡充していく強い意志を有しており、研修センターのアクションプラン（2015－2018 年）を実施する上でも、十分な研修コーディネーターが配置されている。

(2)　給水施設の維持管理

- 両 PSWCs によると、郡レベルで給水施設維持管理に従事する技術者の技能が向上しているといった研修の効果が発現しているということである。今後も、研修を受けた職員と供与機材を活用していくことで、ウォーターヤードの維持管理を継続、向上していくことが見込まれる。
- 第 3 章「３－６－３　中間レビュー時の提言に対する取り組みの進捗」で述べたとおり、センナール州 SWC のシンジャ郡/セクター事務所とゲジラ州 SWC ではデータベースを開発、導入することで、給水施設の維持管理状況、改修ニーズの警報情報等、事務所の運営管理を改善している。

(3)　モニタリング（給水施設維持管理）

- DWSU と PSWCs は、給水施設の効率的な維持管理、現場のニーズを正確かつ迅速に把握するために、継続的なモニタリングシステムを導入していく必要性を認識し

ている。作成されたモニタリングマニュアルに基づいて、モニタリング評価部/ユニットメンバーがウォーターヤードのオペレーター、郡事務所の技術職員及び運営管理職員とともにモニタリング活動を実施することが見込まれる。

４－５－３　財政面

本プロジェクトの財政面の持続性はやや高い。

(1)　研修センターによる人材育成

- 年間予算の拠出は、DWST の場合は連邦政府の財務状況、PSWCs の場合は州政府の財務状況と水道料金収入の状況[57]に左右されるものの、DWST 及び PSWCs は継続して研修活動予算を確保してきた。両 PSWC 研修センターは今後 3 年間の実施計画を策定していることから、財政面の持続性にプラスの要素となっている。

(2)　給水施設の維持管理

- SWCs は各セクター/郡が財務管理を行っている水道料金収入から、施設維持管理費用を捻出している。従って、SWCs にとって、如何に維持管理費用を削減し、モニタリングをタイムリーに行い、早期に機械機材の不具合を把握することができるかという共通課題が残されている。
- SWCs ではいくつかの好事例が確認されている。カッサラ州 SWC では給水施設の維持管理と地方給水サービスの運営管理に必要な財源を確保する為に、都市部の水道料金を改定する予定である[58]。センナール州 SWC のシンジャ郡及びゲジラ州 SWC のメダニ郡では、給水施設運転に係る燃料と電力消費量、水道料金回収にかかる顧客情報をモニターするためのデータベースを開発し、効率的な財務管理を図っている。
- 他方、全ての SWCs にとって、老朽化した施設機材の更新や新規設備投資を行うための予算を確保していくのは困難な状況である。これらの比較的大規模の改修は、州政府及び連邦政府の予算により実施される仕組みとなっている。

(3)　モニタリング（給水施設維持管理）

- パイロット州で SWC 郡事務所とオペレーターが行うモニタリングの費用は、SWC 郡/セクター事務所が拠出していくこととなっている。他方、上記「４－３－２ (2)」で述べたとおり、PSWCs のモニタリング評価ユニットによるモニタリング活動経費（人件費、車両、燃料、計測機材等）の捻出については、ウォーターヤードの多くが広大な面積を有する州全土に点在することから、困難を極めるであろうと PSWC 幹部は懸念している。

[57] 両パイロット州 SWC 及びゲジラ州 SWC によると、例年 SWC が理想とする料金設定が申請通り、州議会で承認されることはなく、各州とも設定値の引き上げにはある程度の年数がかかかっている。ゲジラ州の例では、2005 年に制定された水道料金設定は 2014 年まで改訂されることはなかった。また、改訂された設定値は SWC が申請したレベルには満たない状況である。（ゲジラ州 SWC 聞取り 2015 年 3 月 5 日）

[58] 都市部の水道料金は数カ所に設置された水道メーターからコストを算出して設定された。

４－５－４　技術面

本プロジェクトの技術面の持続性はやや高い。

(1)　研修センターによる人材育成

- DWST と PSWCs の職員は研修運営管理能力に自信をもっており、導入された様々なツール、手法、マニュアル、機材を使用して、今後も活動を継続していく意思を有している。DWST はフェーズ 1 とフェーズ 2 を通し、スーダンにおける給水分野の人材育成の中心的拠点となった。先端技術を継続的に発信していくためには、更に研修機関としてのパフォーマンスを拡充していくことが期待されている。
- 他方、パイロット州以外の SWCs では、DWST と PSWCs の技術サポートにより、研修実施管理の能力を更に向上していく必要性が高い。

(2)　給水施設の維持管理

- スーダンの新規給水施設に設置されている先端技術に対応していくための人材を育成することが求められていることから、DWST では PLC、SCADA、物理探査（2D Geo-Electrical imaging）、太陽光エネルギー給水システム等の研修コースの提供を通し、新たな技術を指導している。

(3)　モニタリング（給水施設維持管理）

- パイロット州の C/Ps は、研修効果を最大限に活かし、給水施設の維持管理の質を向上するためには、給水施設のモニタリング活動と維持管理技術に関し、継続的な技術支援が必要であるとの認識を示している。

４－５－５　阻害要因

- 本プロジェクトの持続性を確保する上で、紛争影響地域であるダルフール地域、南コルドファン州、青ナイル州の治安情勢の安定化は不可欠である。

第５章　結論

本プロジェクトは実施過程でいくつかの内的・外的要因の影響を受けたものの、プロジェクト期間終了までに全成果が充分に達成される見込みである。

「妥当性」については高いと判断される。給水分野の人材育成を担う DWST 及び SWC 研修センターの強化、モニタリング体制の構築を目指す本プロジェクトはスーダンの開発戦略、水・衛生分野の優先課題、対象グループの選択、日本政府の対スーダン援助方針に合致している。

「有効性」については高いと判断される。プロジェクト目標「スーダンにおいて給水人材が適切に育成される」の指標は本調査時点で達成しており、その達成度は高い。治安情勢の不安定な地域においては、当該地域での直接的な技術支援を提供することは困難であるものの、本プロジェクトでは、これら地域の SWC 職員を DWST と PSWC 研修センター、モロッコ第三国研修に派遣することで技術移転を可能とした。

「効率性」についてはやや高いと評価する。フェーズ 1 から DWST での研修により育成された人材の本プロジェクト活動への参画、各種技術コースへの OJT 手法の適用、ステークホルダーとの連携といった要因が 4 つの成果の達成に貢献した。他方、モニタリング部署の設置の遅れにより給水維持管理モニタリングが当初計画よりも遅れたことでやや効率性を下げる結果となった。

「インパクト」については、プロジェクト期間終了から 3-5 年後の上位目標達成の見込みが低いことから中程度と判断される。プロジェクト目標は達成されているものの、上位目標である「スーダンにおける給水システムが適切に管理される」を実現するためには、多様な外部条件が満たされる必要がある。

「持続性」についてはやや高いと判断する。政策・組織面での持続性は高く、財政面、技術面での持続性はやや高い。特に、両 PSWCs の共通課題は、給水施設の維持管理に係るモニタリング活動であり、開発したモニタリングシステムを全てのウォーターヤードに導入し、機能させていくためには、SWC の郡事務所職員、施設のオペレーターの参画が不可欠であり、更なる時間と投入を要するであろう。

今後は、DWSU、DWST、SWCs が以下の提言を考慮し、自主的に活動を継続していくことが期待される。なお、プロジェクトは計画通り 2015 年 9 月に終了することとし、プロジェクト期間の延長は行わない。

第６章　提言と教訓

６－１　提言

プロジェクトの効果を高め、プロジェクト期間終了後の持続性を強化するために、合同評価調査団は以下の活動が行われることを提言する。

６－１－１　プロジェクト期間における活動に関する提言

プロジェクトの成果を確実に達成させるために、以下を提言する。

(1)　中長期人材育成計画（2012－2026 年）の承認

同計画を確実に実施していくために、2015 年 6 月末までに MoHRD の承認を得ることが求められる。

(2)　ウェブサイトを通じた DWST 研修コースの情報公開

給水分野の事業を行う国際機関は、裨益者の技能強化のために DWST の研修コースを利用しており、今後も活用する意向があることから、DWST は 2015 年 6 月末までにウェブサイトを開設し、研修コース案内をウェブサイト上に掲載することが望ましい。併せて、DWSU はウェブサイト管理の担当者を配置する必要がある。DWST にとって、民間セクター、学術機関、MoWRE の他部署へ研修コースを案内し、参加を促進することで、独自収入を得ることが期待される。

(3)　モニタリング計画（ウォーターヤード）の実施

成果 3 に関し、両パイロット州では、ウォーターヤードのモニタリング計画が作成されており、この計画に基づき確実に活動を実施していくことが求められる。

(4)　最終成果発表セミナーの開催

プロジェクト期間終了前に最終セミナーを開催し、プロジェクト成果を SWCs、国際機関を含む関係者間で、共有することが望ましい。同セミナーで共有されるプロジェクト成果としては「中長期人材育成計画 2012－2026 年」の国家人材育成省による承認の確認、「DWST 研修プログラムの情報公開システム」、「ウォーターヤードのモニタリングシステム（活動・様式）」等が考えられる。

(5)　合同セミナー運営委員会の設立

合同セミナーは各州の優良事例を州同士で共有する上で有益であることから、継続することが望ましい。合同セミナーを一層活性化するために、DWSU、DWST、SWCs は運営委員会を設置し、今後のセミナープログラムの企画運営を担っていくことが求められる。

６－１－２　プロジェクト期間終了後も含めた対応に関する提言

本プロジェクトの持続性を確保し、上位目標達成のために実施すべき提言を以下に述べる。

(1)　SWC に対する研修運営管理強化のための技術支援

DWST と PSWC は SWC の研修運営管理システムを強化するために技術支援を提供することが求められる。また、DWST 及び各州の人材の活用に加え、研修機材・器具を活用するために、貸与システムを構築することが望ましい。

(2)　水・衛生セクター戦略計画へのモニタリング結果の反映

次期の水・衛生セクター戦略計画 2017-2021 年[59]にパイロット州のモニタリング結果を反映することが望ましい。

(3)　モニタリング活動の拡充（パイロット州以外の州、ウォーターヤード以外の給水施設）

PSWC はウォーターヤードに加え、配管網、浄水場、ハンドポンプ等の給水施設のモニタリングも実施し、運転・維持管理を向上していくことが望ましい。更に、SWC 及び国際機関等のステークホルダーと協力し､他州へのモニタリングシステムを導入していくことが望ましい。

(4)　モロッコとの技術交流の継続

本プロジェクトでその有効性が確認されたスーダン人 C/P のモロッコ研修への派遣、及びモロッコ専門家の招聘を継続することが望ましい｡モロッコの給水分野の開発経験からの学びを通じ、スーダンが給水分野の政策、制度、戦略を向上していくことが期待される。

(5)　新規キロテン地区研修センターの設立

中間レビュー時の提言と同様に、DWSU は同研修センターの建設計画に係る問題を早期に解決することが望ましい。DWST の新規研修センターの開設後は、東アフリカ地域におけるモデルセンターとなる計画を実現すべく、人材を追加投入し、研修実施体制を強化していくことが不可欠である。

６－２　教訓

調査団は、一連のデータ収集やインタビュー、協議、分析作業を経て、以下の教訓を導き出した。

(1)　オーナーシップを向上する上で有効な手法

第 3 章３－６－１「貢献要因」で述べたとおり、本プロジェクトで取り入れた、以下の手法は、C/P のプロジェクトに対するオーナーシップを向上する上で、その有効性が証明された。

- 類似国モロッコの給水分野経験からの学び
- 研修生への表彰制度
- C/P に加え給水分野関係機関が情報及び意見を交換する機会となる合同セミナー

[59] UNICEF スーダンによると、2015 年中に UNICEF の技術支援の下 DWSU が、水・衛生セクター戦略計画（2011-2016）の進捗を各州で調査し､その結果をもって､次期水･衛生セクター戦略計画(2017-2021 年)を各州が策定する予定である｡(UNICEF スーダン聞取り。2015 年 3 月 9 日)

(2)　類似案件実施への教訓

本プロジェクトではプロジェクト目標は達成されても、上位目標を達成するには複数の外部要因を満たさなくては上位目標が達成されないプロジェクトデザインとなっていた。また、その指標は、上位目標の状態をあらわすものではなかったことから、「インパクト」の評価に影響を与えた。今後、類似案件を形成する際は、より実現可能、入手可能な情報・データを踏まえた、目標と指標を検討することが望ましい。

第７章　団長所感

本プロジェクトの終了時評価においては、5 項目評価結果は妥当性及び有効性が高い、効率性と持続性はやや高い、インパクトは中程度という結果であった。全体的にはアフリカにおける人的資源開発（人材育成）の技術協力プロジェクトとしては、大変良好なプロジェクトといえる。PDM で設定されたプロジェクト目標と 4 項目の成果もプロジェクト終了時までに確実に達成する予定である。しかし、残念ながら上位目標については、プロジェクト終了後 3~5 年程度の期間では達成は一部にとどまることが見込まれる。これは、プロジェクトのデザインとして、「プロジェクト目標を達成して終了後も持続性が確保されていれば、上位目標が達成される」というコンセプトを超える上位目標が設定されたことに起因していると思われる。本件ではプロジェクト目標である給水事業従事者の人的資源開発は達成されるが、上位目標である給水施設が適切に維持管理されるためには、トレーニングされた人的資源だけでなく、組織の設立、機材の投入、予算の確保等が必要であり、プロジェクト終了後 5 年程度で全国全ての給水施設が適切に整備されることは困難と思料される。

本プロジェクトが成功裏に終了できるのは、日本人専門家のご尽力によるのが第一であるが、そのほかの成功の要因として、モロッコで実施された類似 JICA プロジェクトとの協力・連携関係が大きく貢献している。スーダンのカウンターパートをモロッコのプロジェクト視察のために派遣するともに、モロッコの専門家がスーダンに派遣され、研修コースで講義を行うという交流が続けられている。また、研修コースで優秀な成績を修めた研修員を表彰する制度を導入して、研修員のモティベーションを高める工夫もしている。さらに、プロジェクトの全国展開を見据えて、パイロット地方水公社だけでなく、他の地方水公社も早い段階からプロジェクト活動に参加させ、当事者意識とオーナーシップの醸成に努めたことも、プロジェクトの成果達成に寄与している。

プロジェクトへの提言としては、プロジェクト終了までに実施すべきこととして、中長期人的資源開発（人材育成）計画の人的資源開発（人材育成）省の承認取り付け、研修計画の情報をウェブサイトを通じて公開すること、ウォーターヤードについてのモニタリング計画の実施、終了セミナーにおけるプロジェクト成果の共有、合同セミナーのステアリングコミティーの設立の 5 項目を伝えた。また、プロジェクト終了後に持続性を確保して上位目標の達成に寄与するための提言として、地方水公社の研修管理システム強化のために DWSU、DWST、PSWCs による技術的支援、モニタリング結果の「WASH strategic plan 2017-2021」への反映、モニタリングシステムの地方水公社への導入と他の給水施設のモニタリング実施、モロッコとの技術協力の継続、新キロテン研修センターの早期完成の 5 項目を伝えた。

また、スーダン側の本プロジェクトへ対する評価は高く、日本人専門家との長期にわたる交流で強固な信頼関係が構築されており、コミュニケーションも非常に良好であることが伺えた。このため、先方からはプロジェクトの終了を惜しむ声が高く、別の形でもいいのでプロジェクトを継続してほしい旨の要望が寄せられた。なお、国際機関の日本人専門家からも同様の要望が聞かれた。

本プロジェクトは本年 9 月までで終了するため、今後プロジェクト成果の最終化に向けて活動が加速化され、提言事項も実施にむけて動き出すので、スーダン側関係機関との調整や他ドナーとの調整も必要になるため、本部課題部だけでなく現地日本大使館及び JICA 事務所による連携した一層の支援が必要になると思われる。

付　属　資　料

1. ミニッツ・合同評価報告書
2. 活動実績表

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
DRINKING WATER AND SANITATION UNIT,
MINISTRY OF WATER RESOURCES AND ELECTRICITY,
THE REPUBLIC OF SUDAN
ON
THE JAPANESE TECHNICAL COOPERATION
FOR
THE PROJECT FOR HUMAN RESOURCES DEVELOPMENT
FOR WATER SUPPLY PHASE 2

The Terminal Evaluation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") visited the Republic of Sudan (hereinafter referred to as "Sudan") from February 22nd to March 12th, 2015 for the purpose of reviewing the progress and the achievements of the Project for Human Resources Development for Water Supply Phase 2 (hereinafter referred to as "the Project").

During its stay in Sudan, the Team visited the Project area, exchanged views and opinions with stakeholders on the Project and had a series of discussions with the officials of the Sudanese organizations concerned. And the Joint Coordination Committee (hereinafter referred to as "the JCC') was held on March 11th, 2015.

As a result of discussions, the Team submitted the Joint Terminal Evaluation Report as attached and both sides agreed on the matters referred to in the report.

Khartoum, March 11th, 2015

Mr. Yukihiko EJIRI
Leader
Terminal Evaluation Team
Japan International Cooperation Agency

Mr. Mohamed H. M. Ammar
Director General
Drinking Water and Sanitation Unit (DWSU)
Ministry of Water Resources and Electricity
The Republic of Sudan

JOINT TERMINAL EVALUATION REPORT
FOR
THE JAPANESE TECHNICAL COOPERATION PROJECT
FOR
HUMAN RESOURCES DEVELOPMENT
FOR WATER SUPPLY PHASE 2
IN
THE REPUBLIC OF SUDAN

Japan International Cooperation Agency
and
Drinking Water and Sanitation Unit,
Ministry of Water Resources and Electricity,
The Republic of Sudan

March 11, 2015

TABLES OF CONTENTS

ANNEXES

Abbreviations

ABHSMD	The Hydraulic Agency of South Massa-Basin in Morocco
AfDB	African Development Bank
C/P	Counterpart Personnel
DG	Director General
DWSU	Drinking Water and Sanitation Unit
DWST	Drinking Water and Sanitation Unit Training Center
IOM	International Organization for Migration
IPRSP	Interim Poverty Reduction Strategy Paper
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
M/M	Minutes of Meetings
MoH	Federal Ministry of Health
MoWRE	Federal Ministry of Water Resources and Electricity
NGO	Non-Governmental Organization
ODA	Official Development Assistance
OJT	On the Job Training
O&M	Operation and Maintenance
ONEE	National Drinking Water and Electricity Corporation in Morocco
ONEP	National Water Corporation in Morocco
PDM	Project Design Matrix
PO	Plan of Operations
PSWC	Pilot State Water Corporation
R/D	Record of Discussions
SDG	Sudan Pond
SWC	State Water Corporation
ToT	Training of Trainers
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
WB	World Bank
WES	Water, Environment and Sanitation
WHO	World Health Organization

1.INTRODUCTION

1-1. Background of the Terminal Evaluation

The Project for Human Resources Development for Water Supply Phase 2 (hereinafter referred to as "the Project") is a bilateral technical cooperation project between the Government of Japan through JICA and the Government of Sudan through DWSU. This four-year project was launched in November 2011 and will be completed in September 2015[1]. With the remaining project period of about seven (7) months, JICA dispatched the Japanese Team to Sudan from 20 February to 13 March 2015, for evaluating the achievement of the Project. The Joint Terminal Evaluation team consisting of the Japanese Team and DWSU officers has undertaken the terminal evaluation jointly.

1-2. Objective of the Evaluation

Objectives of the terminal evaluation are as follows:

1) To review the degree of the achievement of inputs, outputs and the Project Purpose based on the Project Design Matrix (hereinafter referred to as "PDM") (Annex 1: PDM version. 5);
2) To conduct a comprehensive evaluation of the Project from the viewpoints of five evaluation criteria (defined in 1-5. Methodology of the Evaluation);
3) To identify contributing and hindering factors of the progress of the Project;
4) To formulate recommendations for the Project and relevant parties; and
5) To draw out lessons learned from the Project for future cooperation in the same field.

1-3. Members of the Joint Terminal Evaluation Team

(1) Japanese side

Name	Job title	Occupation
Mr. Yukihiko EJIRI	Leader	Senior Assistant Director, Water Resources and Disaster Management Group, Global Environment Department, JICA
Mr. Koji SHIMIZU	Evaluation Planning	Deputy Director, Water Resources Management Team 2, Water Resources and Disaster Management Group, Global Environment Department, JICA
Ms. Hiroyo ONOZATO	Evaluation Analysis	Researcher, Global Link Management

(2) Sudanese side

Name	Position	Organization
Mr. Egbal B. Alamir	Course coordinator	Department of Training Management, Drinking Water and Sanitation Unit Training Center (DWST)

1-4. Schedule of the Japanese Team

The schedule of the Terminal Evaluation Team is shown in Annex 5-1.

1-5. Methodology of the Evaluation

In accordance with New JICA Guidelines for Project Evaluation, First Edition (June 2013), the Terminal Evaluation of the Project was conducted. The definition of the five evaluation criteria applied in the analysis for the evaluation is given in the table below.

[1] Project period is divided as follows: Year 1 (2011.11 -2012.8), Year 2 (2012.10 -2013.6), Year 3 is (2013.9 - 2014.7), and Year 4 (2014.9 - 2015.10).

Five Evaluation Criteria	Definition as per the JICA Evaluation Guidelines
1. Relevance	Relevance of the plan for the Project has been reviewed in terms of validity of the Project objective and overall goal, in connection with the development policy of the Government of Sudan, the foreign assistance policy of the Government of Japan, the needs of beneficiaries, and the logical coherence of the Project.
2. Effectiveness	Effectiveness is considered by assessing the extent of achievement of the Project objective and the clarification of the relationship between the Project purpose and the outputs.
3. Efficiency	Efficiency of the implementation of the Project is analyzed with focus on the relationship between outputs and inputs in terms of time, quality and quantity of inputs.
4. Impact	Impact of the Project is evaluated on expectation level to achieve the Overall Goal and the basis of direct or indirect, positive or negative, intended or unintended influences generated by the Project.
5. Sustainability	Sustainability of the Project is evaluated on the political, institutional, financial and technical aspects for examining how the achievements of the Project would be sustainable after the period of the Project.

1-6. Data Collection Method

Data collection methods used for the terminal evaluation were as follows:

- Review of the Project documents
- Questionnaires of Sudanese counterpart personnel (C/Ps)
- Key informant interviews of Sudanese counterpart personnel and Japanese experts, to draw out their opinions on the issues above
- Site visits of training centers and workshop, training courses, and water supply facilities

The list of C/Ps and stakeholders consulted is shown in Annex 5-2.

2. BACKGROUND AND OUTLINE OF THE PROJECT

In Sudan, access rate to improved water source was 67.5% in 1990[2]. However, the situation has been stagnant at around 65% (91.1% in urban, 56.8% in rural as of 2010[3]) because of the effects of civil wars[4]. Government of Sudan has made efforts on improving water supply facilities with the aim to achieve full coverage of adequate and safe water supply at consumption rates of 50 liters per capita per day (L/C/day) for the rural population and 150L/C/day for the urban population by the end of 2031 as stated in "Quarter Century Strategy for Water Supply, 2007-2031"[5].

The Decentralization Law, which was approved in 1994, led the local government to have much authority,

[2] Source: WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (http://www.wssinfo.org/)

[3] These figures are average rates of 14 states as of 2010 (Blue Nile, Gedaref, North Kordofan, Northern, Red Sea, River Nile, Sennar, South Kordofan, White Nile, Gezira, Kassala, North Darfur, South Darfur, West Darfur). Source: Documents prepared by JICA experts based on data from 2008 Census and state statistic offices. Average rates for 14 states as of 2010 (Blue Nile, Gedaref, Kordofan North, Northern, Red Sea, River Nile, Sennar, South Kordofan, White Nile, Gezira, Kassala, North Darfur, South Darfur, West Darfur)

[4] Comprehensive Peace Agreement was signed between northern Sudan and Southern Sudan in 2005 followed by the Darfur Peace Agreement in May 2006 and the Eastern Sudan Peace Agreement in October 2006.

[5] Source: "Quarter Century Strategy for Water Supply First phase programme 2007-2011", "National Water Corporation, Ministry of Irrigation and Water Resources (2007)"
As of 2010, consumption rate is 24.0L/C/Day (18.7 in rural 42.1 in urban) according to the document prepared by JICA experts based on data of SWC and WES projects 2010

transferred from the federal government. Before the decentralization, the Public Water Corporation (hereinafter referred to as "PWC"), which renamed as Drinking Water and Sanitation Unit (hereinafter referred to as "DWSU")[6], was responsible for water supply throughout Sudan. Under the decentralization policy, the responsibility for operation and maintenance (O&M) of the water supply facilities was transferred from PWC to State Water Corporations (hereinafter referred to as "SWCs"). Therefore, the role of the PWC became limited to water supply policy, the construction of large-scale water supply facilities, coordination of the international cooperation projects, monitoring of SWCs and human resources development. However, the water sector in Sudan faced serious problems associated with lack of budget, human resources, and equipment in most SWCs.

In response, the Human Resources Development Project for Water Supply in the Republic of Sudan (hereinafter referred to as "Phase 1") was implemented with technical cooperation by JICA for 3 years from June 2008 to March 2011. As a result, PWC Training Center, which renamed to Drinking Water and Sanitation Unit Training Center (hereinafter referred to as "DWST"), developed its training implementation capacity[7]. On the other hand, the issue of human resources development in the water supply sector in the state level remained to be improved further.

Therefore, the Government of Sudan requested the Phase 2 to the Government of Japan with the aim to enhance the management of the water supply system all over the country. The Project has been carried out since 2011 for the period of 4 years until September 2015 with a purpose to train properly human resources in the water supply sector in Sudan. Two pilot States Water Corporations (hereinafter referred to as "PSWCs") of Sennar state and White Nile state were identified for pilot activities through which PSWCs developed training implementation structures as well as the monitoring system for training as well as for O&M of their water supply facilities[8]. At the same time, throughout the Phase 1 and Phase 2, DWSU and DWST strengthened their roles as the main center for the human resources development targeting all 18 SWCs[9]. Details of the project framework is PDM (Annex 1).

---

[6] Ministry of Irrigation and Water Resources was reformed to Ministry of Water Resources in December 2011 and then to Ministry of Water Resources and Electricity in July 2012. Upon this reform in 2012, PWC changed to DWSU to cover sanitation aspect as well in 2013.

[7] SWC was changed to DWSU so as to cover sanitation aspect in 2013, and accordingly PWCT was renamed to DWST.

[8] Access rates to improved water in pilot states were 61.1% (84.2% for urban, 49.5% for rural) in White Nile state, and 82.2% (92.9% in Urban, 79.3% in Rural) in Sennar state. Consumption rates in 2010 were 25.4 L/C/Day (32.2 L/C/Day for Urban, 20.5 L/C/Day for Rural) in White Nile state, and 34L/C/Day (50.0 L/C/Day for Urban, 30.0 L/C/Day for Rural).

[9] The number of states increased from 15 to 18. [1. Khartoum state, 2. White Nile state, 3. Sennar state, 4. Northern state, 5. River Nile state, 6. Gezira state, 7. Gadaref state, 8. Kassala state, 9. North Kordofan state, 10. Red Sea state, 11. South Kordofan state, 12. North Darfur state, 13. West Darfur state, 14. South Darfur state, 15. Blue Nile state, 16. Central Darfur state (separated from West Darfur in January 2012), 17. East Darfur state (separated from South Darfur in January 2012), 18. West Kordofan state (separated from South Kordofan in February 2013)]

3. PROJECT ACHIEVEMENT AND IMPLEMENATION PROCESS

Achievements of the Project are measured in terms of inputs, activities, outputs, project purpose and overall goals, all of which are in accordance with the PDM (Version 5.0) as in Annex 1.

3-1. Inputs

The following is the list of inputs provided for the project implementation. More detail information is described in Annex 2.

3-1-1 Japanese Side

(1) Experts	・ In total, 10 JICA experts have been dispatched in various fields. (Annex 2-1)
(2) Provision of Equipment	・ 245,249,213 Japanese Yen (8,880,298SDG) has been disbursed for the equipment costs of the Project[10]. (Annex 2-4) ・ The list of equipment procured is shown in Annex 2-5.
(3) Local operational Costs	・ The amount of financial contribution from the Japanese side for local operational costs during the Project is 62,607,000 Japanese Yen (3,118,466 SDG) at the time of the terminal evaluation. (Annex 2-4)
(4) Training of C/Ps	・ In total, 36 C/Ps were trained in Morocco through three-group training by Year 3. In addition, 11 C/Ps will be dispatched in Year 4. (Annex 2-3)
(5) Moroccan mission	・ In total, 11 experts have been dispatched from Morocco. (Annex 2-2)

3-1-2 Sudanese Side

(1) Assignment of C/P	・ In total, 68 personnel have been assigned as C/Ps from DWSU & DWST (16), and PSWCs (24 from Sennar state, 28 from White Nile state). (Annex 2-6) [11]
(2) Provision of land, buildings and facilities	・ Office space for the Project has been provided in DWST, Sennar SWC, and White Nile SWC with communication network and electricity. ・ Training space were provided in DWST, PSWCs.
(3) Budgetary allocation	・ DWST and PSWCs secured training activity budget as below. (Annex 2-7) ✓ DWSU: 11,283,200SDG for FY2011 - FY2015[12]. ✓ Sennar SWC: 1,829,621SDG for FY2011 - FY2015[13]. ✓ White Nile SWC: 1,612,765SDG for FY2011 - FY2015[14].
(4) Construction of Kilo Ten training center	・ Construction of Kilo Ten training center has not been completed at the time of the terminal evaluation due to the delay in funding.
(5) Office equipment and furniture for the training centers	・ DWST provided office equipment and furniture, which had been used since Phase 1. ・ PSWCs procured necessary office equipment and furniture for their training centers.

3-2. Achievement of the Project Activities

The Project activities were implemented as shown in Annex 3-1: Achievement of the Project.

[10] There is a difference between the figures mentioned here and those shown in ANNEX 2-5, which is caused by differences in exchange rates used for calculation. Please refer to the note in ANNEX 2-4 for details.

[11] Information of DG and Training center directors of other 16 SWCs (16 DG, 13 Training Directors) are listed in Annex 2-6.

[12] Fiscal year of Sudan starts from 1 January and ends on 31 December. DWST annual budget has increased by 12% from FY2011 to FY2012, 82% from FY 2012 to FY2013, and 18% from FY2013 to FY2014.

[13] Sennar SWC annual budget for training activities has decreased by 57% from FY2012 to FY2013 and increased by 36% from FY2013 to FY2014 and 15% from FY2014 to FY2015.

[14] White Nile SWC annual budget for training activities has increased by 9% from FY2012 to FY2013, 150% from FY2013 to FY2014 and 20% from FY2014 to FY2015.

3-3. Achievement of the Outputs

Findings regarding the achievement of the expected outputs as of the time of the terminal evaluation are as follows:

3-3-1. OUTPUT 1

Output 1: Training courses are implemented by DWST based on its Mid-term/ Long-term human resources development plan.	
Objectively Verifiable Indicators	**Achievement**
1-1 Mid-term/long-term human resources development plan is completed by March 2013.	・ Based on "Quarter Century Strategy for Water Supply 2011-2031", DWST prepared the outline of the "Mid-term and Long-Term Human Resources Developments Plan 2012-2026." JCC discussed and approved it at the 2nd JCC meeting on 27 June 2012. ・ In February 2015, DWST submitted the final draft of the plan to the Federal Ministry of Water Resources and Electricity (MoWRE). ・ Once the MoWRE approves it, DWST will submit the final version to the Federal Ministry of Human Resources Development (MoHRD) for approval and issuing the certificate of authorization.
1-2 Percentage of contributions from training coordinator on the planning and implementation of training courses increases by 100%[15].	・ By the Mid-term review in January 2014, it has been confirmed that contribution rates of DWST training coordinators on planning and implementation of training courses reached 100%.
1-3 Training courses at DWST are implemented more than 20 times annually.	・ DWST implemented training courses for 18 times in 2011, 21 times in 2012, 28 times in 2013, and 23 times in 2014. (Annex 3-1: Activity 1-4)

Output 1 has mostly been achieved by the time of the terminal evaluation as shown in the indicators above.

Based on discussion with MoHRD, DWST worked on finalization of the "Mid-term and Long-Term Human Resources Developments Plan 2012-2026" by integrating the concept of the national strategy of human resources development. It is now at the stage of approval process by MoWRE followed by MoHRD. Regarding technical exchange between Morocco and Sudan, which is stated as one of the activities in the long-term plan, dispatch of experts from Morocco and training of Sudanese C/Ps in Morocco have been conducted annually. Annual training plan at DWST has been also developed based on "Mid-term and Long-Term Human Resources Developments Plan 2012-2026." On the other hand, the plan is on condition that a new Kilo Ten training center is established (Indicator 1-1). Improvement of DWST training coordinators' capacities in training management cycle can be seen in the training curriculum, textbooks and manuals which have been revised by them based on evaluation results of every course by trainees (Indicator 1-2). Although the new training center has not been built yet, DWST have planned and implemented training courses at the larger scale every year than the previous year utilizing the existing training facilities and resources (Indicator 1-3).

Through Phase 1 and Phase 2, DWST developed more than 32 training courses. Participants of these training courses are from more than 30 different organizations[16]. Over 80% of total trainees in DWST are from SWCs in which ex-trainees utilize their trained skills and knowledge as training coordinators as well as trainers as

[15] In Phase 1, DWST with technical advice by JICA Experts developed a quantitative evaluation method for the C/Ps' training management capability. 34 necessary steps for planning and implementing training courses were extracted. After each training course, C/Ps and JICA Experts discussed to what extent C/Ps contributed to each work item and quantified it from 0 to 100. The average of the 34 marks was recorded as a contribution rate.

[16] In addition to 18 SWCs, trainees were dispatched to DWST from El Hawata Project, N.W.E. company, Groundwater & wadis, South Sudan authority, Sudan University, Gezira University, Africa city technology, General Administration of customs, Maritime ports authority of Red Sea state, Sudan currency printing press.

explained in 3-3-2. On the other hand, United Nations Office for Project Services (UNOPS), International Organization for Migration (IOM) and African Development Bank (AfDB), which operate in Darfur states and South Kordofan, dispatched more than 120 trainees from these areas to DWST. The issue is now how DWSU and DWST can develop further by mobilizing available internal and external resources to meet the international standard of training center with the aim to be a core center in Africa, as stated in the "Mid-term and Long-Term Human Resources Developments Plan 2012-2026".

3-3-2. Output 2

Output 2: Training course implementation structures in PSWCs are developed by PSWCs in collaboration with DWST.	
Objectively Verifiable Indicators	**Achievement**
2-1 Percentage of contributions from training coordinators on the planning and implementation of training courses is increased by 80% in the PSWCs	After starting training center in 2012, both PSWCs have achieved target contribution rates (annual average of all courses) of 80% in 2013 as below. ✓ White Nile SWC: 64.8% in 2012, 80.7% in 2013, 89.1 % in 2014 ✓ Sennar SWC: 69.31% in 2012, 84.1% in 2013, 91.2% in 2014 (In addition, Sennar SWC have planned and implemented more than 11 courses by their own without technical guidance by JICA Experts.) (Annex 3-1: Activity 2-7)
2-2 Training courses are implemented according to the SWC training implementation plan.	• According to the annual training implementation plan prepared, each PSWC have implemented the more courses than the previous years. ✓ White Nile SWC: 7 courses (8 times) in 2012, 8 courses (9 times) in 2013, 8 courses (12 times) in 2014 ✓ Sennar SWC: 6 courses (9 times) in 2012, 13 courses (17 times) in 2013, 11 courses (14 times) in 2014 (Annex 3-1: Activity 2-7)

Output 2 has been achieved by the time of the terminal evaluation as shown in the indicators above. In both PSWCs, training coordinators have been increasing their involvement in training designing and implementation utilizing training materials and instructors' cooperation from the previous courses. Satisfaction rates of trainees towards the courses, lecturers and facilities have generally been high at constant rates throughout the Project period[17] (Activity 2-8. It is remarkable that in many courses, PSWC staff members, who were trained at DWST in Phase 1, have conducted training in Phase 2 not only as training coordinators but also as instructors (e.g. water analysis, organizational management, well management, electrical, mechanical & equipment management, data management, water treatment plant management, and pipe network management). On the other hand, many of course coordinators have also taken training courses in their own training centers since 2012 and applied trained knowledge and skills at their work as well as for coordination of training courses (Indicator 2-1).

Based on "Water, Sanitation and Hygiene Sector Strategic Plan 2011-2016" of each PSWC, PSWCs have been performing their mandate. This strategic plan was formulated before PSWCs planned for establishment of training centers. Since the establishment of training centers in 2012, both PSWCs have been able to achieved target number of trainees in technical and managerial training as stated in WASH strategic plan[18]. In order to secure sustainability of training activities in the pilot states, PSWC with JICA Experts have been working on

[17] For detailed figures for evaluation results of course, lecturer & facilities for all courses implemented by PSWCs are listed in Annex 3-1: Activity 2-8)

[18] In Sennar State WASH strategic plan 2011-2016, activities of sector capacity building activities includes (1) training of 100 staff on managerial related issues at all levels, and (2) training of 150 staff on technical issues at all levels. In White Nile state WASH strategic plan 201102016, activities of sector capacity building activities includes (1) training of 120 SWC and MoH staff on WASH related technical and managerial subjects, and (2) training of 150 staff on technical issues.

formulation of "Action Plan 2015-2018", which consists of training implementation plan[19] (Indicator 2-2).

3-3-3. Output 3

Output 3: Monitoring system is established within DWSU and pilot SWCs for training course implementation and O&M of water supply system of PSWCs.	
Objectively Verifiable Indicators	**Achievement**
3-1 Monitoring manual is completed by March 2015.	• The monitoring results of water yards at the model sites in selected localities for PSWCs were reflected for finalization of the manual. After the monitoring workshop were held at both PSWCs in January - February 2015, monitoring & evaluation units completed the following monitoring manuals. ✓ "DWSU Monitoring manual – Water Yard. March 2015", ✓ "DWSU/DWST Monitoring manual – Human Resources Development (Training). March 2015" (Annex 3-1: Activity 3-7)
3-2 Monitoring activities are implemented according to schedule.	(1) Training implementation • DWST and PSWCs have been conducting monitoring activities for training implementation along with their annual training plan.
	(2) O&M of water supply system (Water yards)[20] • According to the monitoring plan of 2014-2015, Monitoring & evaluation units conducted monitoring activities of the water yards in model sites in Year 4. ✓ 114 sites in Tandalti locality of White Nile state ✓ 116 sites in Singa locality of Sennar state • Monitoring & evaluation units of each PSWC have been conducting monitoring activities (baseline survey of water yards) for rests of the localities with their goal to complete by the end of 2015.

Output 3 has been achieved by the time of the terminal evaluation as shown in the indicators above. In Output 3, two components (1. Training implementation, 2. O&M of water supply system, specifically water yards) are expected to be covered by the monitoring framework linking the locality level to the state level and the state level to the federal level.

(1) Training implementation

As explained in 3-3-1, in terms of monitoring framework for training implementation, the degree of achievements for establishing the monitoring system is high both at DWST and PSWCs. In case of DWST, course coordinators with JICA Experts developed tools and methods for training implementation as well as monitoring & evaluation during Phase 1. They have been practicing these effective methods and tools repeatedly during Phase 2. Similarly, in PSWCs, training coordinators have also adopted these methods and developed training database, which includes course materials and trainees' information and results of course evaluation by trainees. Based on the monitoring plan developed by each state[21], PSWCs started to share accumulated data with the DWST monitoring unit by form of "Training monitoring report". These achievements can be recognized as the significant outcomes of the foundation of training monitoring structure at both SWCs. It is expected for DWST to systematically analyze the data received from PSWCs and feedback

[19] It consists of (1) Concept of human resources development, (2) Issues of water supply, Needs of human resources, Training target, (3) Achievement of human resources development (The number of courses & trainees, Comparison with State WASH strategy 2011-2016), (4) Training implementation structure, (5) Three year training plan (2014-2018) (The number of courses & participants, Target number of trainees, Budget). Source: "Sennar State Water Cooperation Training Center Action Plan (2015-2018) – Human Resources Development for Water Supply (Draft)".

[20] The number of water yards is 720 in Sennar state (Source: Sennar SWC, 2015.02.24) and 372 in White Nile state. (Source: White Nile SWC, 2015.03.05)

[21] "Sennar SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014.", "White Nile SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014."

to PSWCs and other SWCs as well as highlight good practices and lesson learned from training center activities.

(2) O&M of water yards[22]

Regarding the monitoring framework for O&M of water yards, DWSU and PSWCs have accelerated their activities after the Mid-term review in January 2014. Newly formed monitoring & evaluation unit members of White Nile state and Sennar state, developed the monitoring format to measure and record condition of water yards[23]. According to the water yard-monitoring plan[24] and the monitoring manual, data of each water yard at locality level have been compiled in the database by monitoring & evaluation unit of PSWC. Moreover, in Sennar state, results of monitoring data analysis is compiled in the action plan for rehabilitation of water yards by monitoring & evaluation unit members[25].

It is planned, after PSWC monitoring & evaluation units complete the monitoring activities for baseline information of water yards in all localities by 2015, regular monitoring activities with involvement of sector offices will be followed, including daily recording by water yard operators. They are planning to prepare rehabilitation plan for each locality upon completion of the monitoring activities for baseline data. Moreover, as instructed in the monitoring manual, it is planned for PSWCs to systematically update water yard data from all localities on their database and send regularly to DWSU information center for updating the database of existing water supply facilities in Sudan[26]. It is also intended that DWSU and DWST to utilize database for formulating of national water supply plan and systematic mobilization of equipment and materials provided by external supports.

3-3-4. Output 4

Output 4: Training course implementation structure is developed within each SWC in Sudan in collaboration with DWST.	
Objectively Verifiable Indicators	**Achievement**
4-1 Human resources development manual is completed by March 2015.	・ DWST started developing the "Human resources development manual" in line with "Mid-term and Long-Term Human Resources Developments Plan 2012-2026". ・ DWST is planning to finalize the manual by March 2015 and distribute it to all SWCs.
4-2 Joint Seminar to share and disseminate the outputs of PSWCs are implemented 6 times.	・ DWST and SWCs implemented Joint Seminar for 6 times by November 2014 and have been planning for the seventh seminar in August or September 2015 for sharing outputs of PSWCs as well as achievements of other newly established SWC training centers. (Annex 3-1: Activity 4-3)

Output 4 has been achieved by the time of the terminal evaluation as shown in above indicators. By reflecting the results of Output 1, 2 and 3, DWST has been working on development of "Human resources development

[22] According to State WASH strategy plan (2011-2016), consumption rates of improved water are 25.4(l/c/d) at White Nile state and 34.0 (l/c/d) in Sennar state. In both states, water supply is much lower in rural area than urban area. Thus, for monitoring activities, C/Ps and JICA Experts decided to focus on water yards which are the main water supply facilities in rural areas.

[23] Water yard monitoring formats were developed for (1) Baseline survey, (2) Annual survey for SWC monitoring units, (3) Seasonal survey, (4) Monthly survey for SWC locality, and (5) Daily recording for operators.

[24] "Sennar SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014.", "White Nile SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014."

[25] "Sennar SWC Monitoring Follow-up and Evaluation Unit Action Plan – Water Yard Rehabilitation (2015-2016). February 2015." In this plan, Shinja sector office will conduct rehabilitation of 14 water yards with high priorities by December 2015.

[26] DWSU Information center/Monitoring & evaluation department use "WES Information System" which has been developed since 2005 with support of UNICEF. This database covers hand pump, water yard, hafir/dam, open well, water plant, sanitation hygiene, training, school water/sanitation, rehabilitation/O&M.

manual" in Year 4. It is intended that all SWCs utilize this manual (Indicator 4-1). The series of Joint Seminar have brought about increases in motivations and active information sharing among relevant C/Ps including all SWCs, relevant line ministries, international organizations and local organizations in the water, sanitation and hygiene sector (Indicator 4-2).

One of the significant achievements by SWCs is establishment of training centers by their own resources with technical advices by DWST and JICA Experts. Since the beginning of Phase 1, 14 SWCs out of 18 SWCs established training centers among which 2 centers are currently under renovation (Annex 3-1: Activity 4-2). These achievements at state level have been led by initiatives of SWC management staff and engineers who were trained at DWST during Phase 1 and/or participated in Joint Seminar in Phase 2. The Project contributed on provision of equipment for these newly established training centers. In addition, DWST provided technical advice on training management, training materials, and introducing course lecturers, as well as setting up of water analysis lab and computer lab[27]. In the most recent case of North Kordofan state training center, PSWCs visited and held a workshop for North Kordofan training center staff to transfer their training management system that they built through the Project. These technical exchanges among different states have been activated through unique gathering occasions of the Project such as Joint Seminar and JCC, Study tours, and Training in Morocco and by DWST training centers.

3-4. Achievement of the Project Purpose

Findings regarding the achievement of the Project Purpose at the time of the terminal evaluation are as follows:

Project Purpose: Human resources in water supply sector are properly trained in Sudan.	
Objectively Verifiable Indicators	**Achievement**
1. The number of trainees that are trained in Sudan exceeds 2,000.	・ Total number of training participants reached 1,775 in DWST and 941 in PSWCs. Thus in total, the number of the trainees in Sudan exceeds 2,716. (Annex 3-1: Activity 1-4) ✓ DWST: Total 1,629 [182 (2009), 231 (2010), 219 (2011), 287 (2012), 380 (2013), 330 (2014), 146 (as of 11 March 2015)] ✓ Sennar SWC: Total 418 [92 (2012), 174 (2013), 133 (2014), 19 (as of 5 March 2015)] ✓ White Nile SWC: Total 523 [82 (2012), 133 (2013), 222 (2014), 86 (as of 5 March 2015) ・ The number of trainees that were trained in non-pilot SWCs is also increasing as shown in Annex 3-1: Activities 4-4.
2. The number of annually maintained water yards is increased to more than 20 in each PSWC.	・ Renovation and maintenance of the water yards (pump, control panel, generator, well rehabilitation, water tap, elevated tank, pipes, and others) have been conducted for more than 20 in each PSWC in Year 4 as below. ✓ Sennar state: 32 sites (57 items) in 6 localities[28] (2014.10.01-2015.02.02) ✓ White Nile state: 48 sites (85 items) in 3 localities[29] (2014.10.02-2015.02.20)

The Project Purpose has been achieved at the time of the terminal evaluation as shown in the indicators above.

[27] As in Annex 2-5, sets of training equipment were installed at SWCs in Northern state, River Nile state, Gezira state, Gadaref state, Red Sea state, and North Kordofan state. DWST Director provide technical guidance for basic facility components and training center management.

[28] Information are available for 6 localities out of 7 localities. Data from other 1 locality is not available at the time of the terminal evaluation.

[29] Information are available for 5 localities out of 8 localities. Data for 3 other localities are not available at the time of the terminal evaluation.

Throughout the Project period, DWST and both PSWCs have increased their training capacities by accepting the larger number of trainees with more varieties of training courses associated with stable training budget. This is the indication of high commitment given by DWSU and PSWCs for the human resources development in the water supply sector regardless of the recession that Sudanese economy has been experiencing in recent years[30] (Indicator 1). Regarding water yard maintenance, PSWCs staff members including those from sector offices participated in On the Job Training (OJT) for rehabilitation of water yards at the communities[31]. Besides training courses, trained engineers and technicians have been utilizing available equipment and tools for rehabilitation and maintenance of water yards. In addition, as explained in 3-3-3, Shinja sector office has started implementation of the rehabilitation plan of the water yards in response to the monitoring result and analysis (Indicator 2).

3-5. Prospects for Achieving the Overall Goal

Findings regarding the achievement of the Overall Goal are as follows:

Overall Goal: Water supply system is properly managed in Sudan.	
Objectively Verifiable Indicators	**Achievement**
1. SWC staff utilizes their knowledge and technical skills to maintain and operate water supply facilities.	▪ PSWCs staff members who were trained in DWST, PSWC training centers and the third country training courses[32] have been utilizing their technical skills and knowledge for their work at the locality level as illustrated in following good practices. ✓ Trainees of well management, electrical management, mechanical management, equipment management and pipe network management engage in rehabilitation of borehole (air lift), pumps, control panels, generators, elevated tanks and pipes during and after the courses. ✓ Trainees of community development involved in rehabilitation of water yard environment during the training. ✓ Ex-trainees of pipe network management engage in rehabilitation of pipes as well as designing of distribution network. ✓ Ex-trainees of water quality management revised water analysis database both for water treatment plant and water yards as well as the reporting format for analysis results. ✓ Ex-trainee of database management and GIS/Remote sensing developed database of water facilities, water yards, alarming system for rehabilitation needs, consumption of electricity for operating water facilities and customer account as well as administrative and personnel information of the sector.

It is assumable to say that the indicator of the Overall Goal will be achieved to some extent in two pilot states and some states within three to five years after the completion of the Project. As mentioned in 3-4, the Project Purpose has mostly been achieved and continuation of the Project effects will be depend on how far DWSU, DWST and every SWC can activate their monitoring structures and system for water supply facilities. However, the number of existing water facilities is large in the vast extent of land in Sudan. Types of facilities vary from treatment plant, water yard, slow sand filter, hand pump, dug well, small dam, and hafir. On the other hand, in order to achieve the Overall Goal, external factors as stated in PDM as important assumptions have to be

[30] After losing three quarters of oil production associated with the session of South Sudan in 2011, Sudanese economy is in recession. Government of Sudan has applied austerity measure since 2012. GDP growth rates remain negative at -3% in 2011, -10% in 2012, -6% in 2013. Inflation rates (consumer prices) remain high at 22% (2011), 37% (2012), 29% (2013). (Source: World Bank. World Development Indicators) Therefore, DWSU like other authorities have faced tight financial condition with disbursement rates of around 50% of approved budget amount from Federal Ministry of Finance. (Source: DWSU)

[31] Especially through well management, mechanical management, electrical management, and equipment management courses,

[32] Some of PSWCs staff members participated in training in Morocco (as Annex 3-1: Activity 1-4) and JICA GIS training in Ethiopia.

fulfilled (1. PSWC's staff who complete training courses do not leave SWC, 2. There is no climate change or disaster that affect the operations of water facilities, 3. Necessary budget, personnel, equipment etc. are provided in SWC at the appropriate timing).

3-6. Project Implementation Process

3-6-1 Contributing factors

(1) Method of transferring skill, knowledge and techniques

<Training management cycle, evaluation method and budget planning tools developed at DWST in Phase 1>

- As mentioned in 3-3-2, PSWC training coordinators have adapted to the training management cycle including the evaluation method developed at DWST in Phase 1. In addition, in Phase 1, DSWT analyzed training costs and developed training budget-planning format. In Phase 2, not only DWST but also PSWCs and some other newly established SWCs use this budget planning method and format. After one year since the opening of their training centers in 2012, PSWCs have been able to manage accurate budget planning and timely disbursement for training center activities.

<Awarding system for the trainees with high technical levels>

- Since Phase 1, DWST has issued the special certificate for the trainees with high technical levels. This resulted in promoting motivations of trainees in active participations in training courses as well as their work back in their states.

<Technical exchange among SWCs>

- Starting from Phase 1, SWCs such as Kassala SWCs and Gezira SWCs have contributed on the expansion of the technical transfer through dispatching their staff members as training course instructors to DWST and PSWCs[33]. Consequently, DWST and SWCs have been able to coordinate dynamic technical transfer by mobilizing available resources throughout Sudan. For instance, regarding well management course, Kassala PWC dispatched 3 staff member as instructors for the rehabilitation of the 1st well during the 1st course in PSWCs. For the rehabilitation of the 2nd well, those PSWC trainees involved in the 1st rehabilitation transferred their trained skills to new trainees. This method was repeatedly applied to increase the number of trained electrical and mechanical engineering staff as well as geologists of PSWCs in well management.

<Joint seminar and study tours>

- Information and opinion exchange opportunities have increased among participants from different states and localities not only through training in DWST and PSWCs but also through Joint Seminar and study tours implemented in different states[34].

<Training in Morocco and dispatch of experts from Morocco>

- Training in Morocco and dispatch of experts from Morocco have led mutual effects on both Sudanese side and Moroccan side. For Moroccan side, which had been providing training in French, it became new opportunity to provide training in Arabic. Relevant Moroccan authorities also gained more experiences in hosting third country training in North African Region.

<Collaboration with other JICA Projects and Program>

- Mutual effects have been identified through collaboration with other JICA Projects, which implement water supply sector supports[35] and implement health sector support in the same target state[36]. Collaboration

[33] Kassala SWC staff members instructed the training courses in water tariff management, Geophysical Survey (2D Geo-Electrical Imaging), and well management. Gezira SWCs staff members conducted training in database management in Sennar SWC.
[34] In study tour by PSWCs in , trainees visited water treatment plants in Kassala state, Gadaref state, and Gezira state
[35] "Capacity development project for the provision of services for basic human needs in Kassala"(2011.05-2015.04), "Project for Human Resources Development for Darfur and the Three Protocol Areas"(209.05-2013.06)
[36] "Frontline maternal and child health empowerment project phase 2"(2011.09-2014.09) was implemented in Sennar state.

was also made with Japan Overseas Cooperation Volunteer (JOCV) in electric/electronics for implementation of the training courses in PSWCs.

- The Project also collaborates with "The Project for improvement of water treatment plant in Kosti city" with survey activities in the target areas. JICA Experts conducted Kosti special training for relevant C/Ps of the grant project with objectives of increasing capacities in management of mechanics, equipment and electricity.

(2) Project management system

C/Ps and JICA Experts have activated communications through JCC meetings, series of the Joint Seminar and regular meetings of SWC DGs with DWSU and DWST[37]. In addition, foundation of relationship among C/P organizations had already developed through Phase 1 of the Project since most of the training center directors of SWCs participated in the series of the training courses in DWST during Phase 1. Moreover, team work spirit of C/Ps have strengthened through the Project and brought about effective Project management.

(3) Appropriate assignment of C/Ps

DWSU, DWST and SWCs assigned C/Ps appropriately in terms of number, position, and capacities (Annex 2-5). Especially those who were trained in Phase 1 played the significant roles as the training center directors of SWCs as well as training instructors and coordinators for various courses (e.g. water analysis, organizational management, well management, electrical/equipment/mechanical management, data management, water treatment plant, pipe network management) in PSWCs.

(4) High recognition and participations of DWSU, DWST, SWCs

Through Phase 1 and Phase 2, DWSU and DWST staff members have highly recognized the Project activities. SWCs are also highly recognize the Project as reflected in the establishment and operations of training centers in 14 states and the active participations by all SWCs in JCC, Joint Seminar and training activities as explained in 3-3-4. In Phase 1, executive staff members and engineers of SWCs were core targets of the capacity development on series of training courses at DWST. It was their responsibility to disseminate their trained skills and knowledge to their colleagues. In Phase 2, once they established training centers they became the directors and course coordinators of these centers. Some of them became the Director General of SWCs.

(5) Involvement of other stakeholders

Through training activities and Joint seminar, other organizations (e.g. Hawata water corporation, women's association) besides SWCs involved in the Project as trainees. International organizations (e.g. UNICEF, UNOPS, IOM, and AfDB) collaborated with DWST in human resources development in the water, sanitation and hygiene sector.

3-6-2 Hindering factors

(1) Changes in pre-condition for Output 1 & Output 3

Project activities have been implemented in line with the initial Plan of Operations (PO) for Output 2 & 4. On the other hand, there are some changes in pre-conditions for Output I due to lack of new Kilo Ten training center up to present and for Output 3 caused by delay in establishment of the Monitoring & Evaluation Department/Units in DWSU and PSWCs till Year 3. Because of the organizational reform of the Ministry of Irrigation and Water Resources to Ministry of Water Resources in December 2011, and then to Ministry of

[37] Information of JCC and Joint seminar are shown in Annex 3-1 Achievement of the Project "List of meetings" and Topics and participants

Water Resources and Electricity in July 2012, Public Water Corporation also reformed to Drinking Water and Sanitation Unit. As a result, there was delay in establishment of the Monitoring & Evaluation Department by DWSU.

3-6-3 Responses to the recommendations by the Mid-term review

In order to improve the implementation mechanism and environment of the activities during the remaining period, the Mid-term review team made the following recommendations (1) to (4). In response, following actions have been undertaken since January 2014.

(1) Construction of a new Kilo Ten Training Center

In order to maximize outcomes of the Project and to provide more opportunities to participate in the training courses, which coordinated by DWST, it is essential to establish a new Kilo Ten training center. With attempt of DWSU to solve the funding and contracting issues for construction, there had been discussion among relevant parties of DWSU and the donor. However, the construction of the training center building is unlikely to complete within the Project period.

(2) Assigning a sanitation expert in DWSU

DWST newly hired a sanitation management coordinator in June 2014. As a course coordinator of sanitation management, he has designed and coordinated the sanitation management course at DWST. MoWRE and Ministry of Health (MoH) had discussion to clarify their roles in water, sanitation and hygiene. As a result, it has been clarified that roles of DWSU and SWCs are to manage sanitation of water facilities and their surroundings as well as water quality as service providers. On the other hand, roles of MoH is to increase awareness of end users of water regarding hygiene.

(3) Establishment of monitoring units

Monitoring & evaluation department/units were formulated in DWSU, Sennar SWC and White Nile SWC with appropriate allocation of staff members (Annex 3-1 Achievement of the Project: Activity 3-1). Due to delay in formulation of the monitoring units, monitoring activities for water supply facilities under Output 3 were activated after the Mid-term Review in January 2014. Given the limited remaining Project period and inputs (e.g. human resources, equipment, vehicle), PSWCs monitoring & evaluation units have been able to conduct monitoring activities for water yards in selected localities as explained in 3-3-3.

(4) Develop business mind and management capacities

There are good examples of developing business mind and management capacities as follows.

- In Shinja sector office of Sennar SWC, director with technical support by the computer engineer of Gezira SWC developed various databases to improve management capacities of the sector office as mentioned in 3-5. Through these databases, director is able to capture situation and trend of electricity consumption by clients, consumption of electricity to operate water facilities,[38] and information of water facilities with malfunction that are to be rehabilitated. Consequently, it has led to efficient management for tariff collection as well as cost saving by capturing adequate operation hours and timely maintenance, and rehabilitation of water yards. Gezira SWC has applied the same system in Wad Medani and linked the database network with the training center so that sector office staff can receive training at the computer laboratory of the training center. Through introducing this database system to all sector offices in near future, Gezira SWC is aiming to provide timely and useful data to the management for decision-making.

[38] In Sennar state, water tariff is collected through linking to the National Electricity Corporation pre-paid digital collection system.

- In case of Northern SWC training center, director has been working on income generation utilizing facilities and equipment such as through providing car repair services and vocational training.
- DWST provides management courses covering accounting and financing topics as well with objectives to build capacities of SWC staff in management capacities.

4. RESULT OF THE EVALUATION IN TERMS OF FIVE CRITERIA

Each criteria is judged using 5 grades (High, Relatively high, Moderate, Relatively low and Low). Positive factor is indicated as [+]. Negative factor is indicated as [-].

4-1. Relevance

Relevance of the Project is high as evidenced by the following factors.

The objectives and activities of the Project are in line with policies and strategy of the Government of Sudan and the Government of Japan, Project design, selection of the target groups, and Japanese technical expertise as follows.

4-1-1. Consistency with the policy/strategy of Government of Sudan

- [+] As stated in Sudan Interim Poverty Reduction Strategy Paper (IPRSP), the key challenges in the area of safe water provision in Sudan include 1) inadequate sector policies, plans, implementation and coordination, 2) lack of resources for investment in conservation, water quality and monitoring, 3) lack of community awareness of water supply & sanitation issues, and 4) the poor record of sustainability of interventions, for which DWSU, DWST and SWCs with localities are responsible[39]. In order to tackle these challenges, the national priority is given for capacity building and community empowerment training programs in the water, sanitation and hygiene sector partners as federal, state, and community level.
- [+] In "Quarter Century Strategic Plan for Water Supply (2007-2031)", the Government of Sudan set the target to achieve full coverage of adequate and safe water supply for the population at a consumption level[40]. Under the "Water Sanitation and Hygiene (WASH) sector policy (2010)", the government developed "Water Sanitation and Hygiene Sector Strategic Plan (2011-2016)" for federal and states and implemented with the aim to facilitate the increase of access to safe water.

4-1-2. Project design

- [+] At the end of the Phase 1, the issues of human resources development in the water supply sector in the state level remained to be improved further. The Project is designed to develop human resources through strengthening the training structure at the federal level and the state level, which is the subject of Output 1, 2 & 4. In addition, the Project integrated the approach to establish the monitoring system linking localities, states and federal for O&M of water supply facilities in addition to monitoring system for training implementation, which is the subject of Output 3.

---

[39] Source: International Monetary Fund. 2013. Sudan Interim Poverty Reduction Strategy Paper (P. 46). The basic goals of the Government is emphasized to maintain a consumption rate of 90 liters per capita per day (L/C/D) for urban centers and 20L/C/D for rural areas and to achieved the MDGs of access to improved water at 82% of population and improved sanitation facility at 67% of population by 2015. IPRSP is to support implementation of The 3-year Salvation Economic Program (2012-2014), which is an emergency plan for adjusting to new political and economic situation upon secession of South Sudan, and The 5 year Development Plan (2012-2016).

[40] Source: Ministry of Irrigation and Water Resources. National Water Corporation. (2008). Quarter Century Strategy for Water Supply: First phase programme 2007-2011. (P. 2) Goal is set for consumption rate of improved water at not less than 20-50 L/C/day for rural areas and 150 L/C/day for urban areas.

4-1-3. The selection and needs of the target groups

- [+] The Project targets all 18 SWCs among which two SWCs were selected as pilot sites. In term of their locations next to each other and convenience, it was appropriate to select White Nile state and Sennar state for the pilot states. Regarding Sennar state, since the "Frontline maternal and child health empowerment project" had been implemented since 2008, it was expected to generate mutual effects between the health sector and the water supply sector. As for White Nile state, the grant project by Government of Japan has been planned for rehabilitation of water treatment plants in Kosti. It is expected to have mutual effects as well. As mentioned in 3-6-1, expected mutual effects have been generated through collaboration with other JICA technical cooperation projects covering the water supply sector in Kassala state, Darfur states, South Kordofan state and Blue Nile state and the health sector in Sennar state as well as with grant projects for water treatment plants in White Nile state and Kassala state.

4-1-4. Consistency with the Japanese aid policy and strategy

- [+] Japanese development assistance policy for Sudan is to contribute on promoting sustainable peace through improvement of basic infrastructure and poverty reduction. Improvement and maintenance & management of the water and sanitation infrastructure is one of the priorities. The Project is identified as the part of the water and sanitation support program, which aims to strengthen water & sanitation facilities and management capacities as well as improvement of public service of the water supply sector.

4-1-5. Japanese technical expertise in the water supply sector

- [+] Japanese ODA to Sudan in the water supply sector started in the 70s utilizing its technical expertise for rehabilitation of water supply facilities etc. In addition, the Project utilized resources of Moroccan water supply authorities, which achieved development the water supply system with involvement of technical cooperation by JICA since the 80s.

4-2. Effectiveness

Effectiveness of the Project is high as evidenced by the following factors.

4-2-1. Achievement forecast and causal relations of the Project Purpose and Outputs

- [+] As mentioned in 3-4, achievement level of the Project Purpose indicators is high. Increases in number of trainees are results of the strengthened training implementation structure with collaboration among DWST, PSWCs and SWCs under Output 1, 2 & 4. As explained in 3-4 and 3-5, trained engineers, operators and technicians in Output 1 & 2 have increased the number of maintenance of the water yards.
- [+]&[-] With the systematic monitoring & evaluation approaches just developed in Output 3, it is expected to improve O&M of water yards which does not have direct link to the Project Purpose.

4-2-2. Constraints

- [+]&[-] As in PDM, the pre-condition for the project framework includes "Political conflicts do not occur." On the other hand, security conditions have not been stable in Darfur states, South Kordofan state, and Blue Nile state. Due to travel restrictions of DWST staff and JICA Experts to these areas, it has been hindering the Project to provide on-site technical transfer directly. In response to these constraints, DWST and PSWCs coordinated some special training courses to receive trainees from Darfur states.

4-2-3. Utilization of lessons from other JICA projects and scheme

- [+] Training in Morocco and dispatch of Moroccan experts to Sudan brought about initiation of South-South cooperation between Sudan and Morocco in the human resources development of the water supply sector. JICA have started technical cooperation in the water supply sector with Morocco since the 90s.

Morocco was selected as the training sites because of their significant achievement in water supply development associated with development of sound policy, strategy and water laws as well as integration of communities. Relevant C/Ps in Sudan gained knowledge and skills through lessons shared with the Moroccan water supply authorities.

- [+] "Capacity development project for the provision of services for basic human needs in Kassala" Project shared its resources through dispatch of trainers from Kassala SWC for well management, water tariff collection, urban water supply and geophysical survey training.

4-3. Efficiency

Efficiency of the Project is relatively high as evidenced by the following factors.

4-3-1. Achievement level of the Outputs

- [+] As explained in 3-3, all Outputs have mostly been achieved by the time of the terminal evaluation. As mentioned in 3-1, inputs from the Japanese side were appropriate in terms of number, expertise, and timing of dispatching experts and providing equipment. DWST and SWCs have utilized equipment procured by the Project for training courses. Regarding the Sudanese side, DWST and PSWCs allocated necessary budget for the Project activities from their annual training budget and provided project office space, training facilities and necessary expenses to operate the planned activities. C/Ps and operations staff have been allocated in the timely manner to cover Output 1, 2, & 4 activities.
- [-] However, delay in inputs for Output 1 and personnel allocation for Output 3 have lowered efficiency of the Project as explain in the following 4-3-2 (2).

4-3-2. Contributing and Hindering factors for achievement of the Outputs

(1) Contributing factors

<Utilization of experiences gained through DWST training>

- [+] As explained in 3-6-1, core target groups of Phase 1, who were trained in a series of expertise at DWST, performed active roles in Phase 2 as training coordinators, instructors and training center directors in PSWC and other SWCs. Training center staff at PSWCs have efficiently adapted to the training management cycle by utilizing their experiences and technical skills gained during their stay in DWST.

<OJT for technical courses>

- [+] As explained in 3-4, regarding technical courses such as well management, electrical management, equipment management and mechanical management, PSWCs applied OJT method to ensure practical transfer of necessary O&M skills at water facility sites.

<Collaborations among stakeholders>

- [+] Collaboration among DWST and SWCs as well as with other JICA projects have resulted in efficient management of the Project activities such as training in Morocco, study tours for water treatment plants in various states, training courses at DWST & PSWCs by inviting other SWCs staff as instructors.
- [+] DWST has been able to enrich their outreach training services through collaboration with international organizations in providing training services to their program beneficiaries from conflict-affected areas.

(2) Hindering factors

<Delay in inputs by the Sudanese side for Output 1>

- [-] As explained in 3-6, delay in construction of new Kilo Ten training center, which is designed to have the larger capacities, caused changes in scope of some activities under Output 1. Although DWST has continued training implementation in the existing facilities, DWST has managed implementing the

training plan every year at the larger scale than previous years.

<Delay in personnel allocations by the Sudanese side for Output 3>

- [-] Delay in formulation of the monitoring units resulted in slow start of relevant activities especially for water yard monitoring under Output 3. With limited number of staff members, equipment (e.g. water level meter, EC meters) and vehicles, it has been a challenge for PSWCs monitoring & evaluation unit members to manage water yard monitoring on sites in parallel with training course implementation.
- [+] Nevertheless, the Project succeeded to develop manual and formats for monitoring O&M status of water yard as well as for monitoring training implementation. However, it is still necessary for PSWCs with sector offices and operators to adapt themselves to this constant monitoring system. It is common understanding among C/Ps and JICA Experts that the more inputs are necessary to monitor O&M status of all the existing water yards most of which are located in remote areas.

4-3-3. Important assumptions on the attainment of the Outputs

Important assumptions set out in PDM both positively and negatively affected attainment of Outputs as follows.

- [+] As mentioned in 3-3-1, throughout the Project, DWST and PSWCs have secured annual training budget constantly in spite of austerity measures by Government of Sudan and high inflation rates.
- [+]&[-] Organizational reforms were taken placed in December 2011 (from the Ministry of Irrigation and Water Resources to Ministry of Water Resources) and in July 2012 (Ministry of Water Resources and Electricity). In 2013, Public Water Corporation also reformed to Drinking Water and Sanitation Unit to integrate sanitation aspect which is the positive factor for the organization.
- [-] Some training coordinators working in DWST in Phase 1 left their jobs. However, DWST has managed training implementation activities with existing staff and new staff during Phase 2. PSWCs maintained the mostly the same training center staff members since the establishment of the centers.
- [+] Budget, human resources and necessary equipment have been provided properly by DWSU, DWST, and PSWCs for the project implementation.

4-4. Impact

Impact of the Project is moderate because Overall Goals is unlikely to be achieved within three to five years after the completion of the Project. On the other hand, there are noticeable positive impacts as evidenced by the following factors.

4-4-1. Prospect of achieving the Overall Goal

- [-] As mentioned in 3-5, it is assumable to say that the indicator of the Overall Goal will be achieved to some extent in pilot states and some other states within three to five years after the completion of the Project. Capacity development of SWC staff members are affected by operational management factors (financial, organizational, and environmental such as facilities and equipment availabilities, and security condition). In other words, if necessary inputs are allocated for O&M of water supply facilities in the sustainable manner, it is possible for trained SWC staff members, technicians and operators to properly manage water supply facilities in their states and localities with utilization of their knowledge & skills. However, in order to ensure achievement of the Overall Goal, it is also prerequisite to establish the monitoring system at every state and grasp the situation of the existing water supply facilities not limited to water yards throughout the country. Moreover, it is essential for DWSU and SWCs to fully coordinate with relevant stakeholders including Water Atlas Project and Groundwater & Wadis to carry out monitoring activities.
- [-] Setting of Overall goal in the Project framework was not appropriate in terms of external factors & time taking for building management of water supply system in the country. That is because improvement

of the water supply system required capital inputs of water supply facilities, improvement of O&M of those facilities with equipment and tools in addition to human resources development.

4-4-2. Institutional aspect

- [+] Reputation of DWST as the main training center for the water supply sector has increased because of continuous efforts of DWST staff members since its establishment in 2008. While DWST has been increasing their training implementation capacities year by year, there are more inquiries from local organizations and international organizations than before. Since the participants in the training courses in DWST are not only from SWCs but also from various organizations such as research institutes, and universities, it is the positive factor to identify the clients' training needs in future.
- [+] As explained in 3-3-4, prior to the Project, majorities of SWCs did not have training centers. The Project stimulated the motivations of other SWCs. As a result, training center was established in 14 states out of 18 states with self-effort.

4-5. Sustainability

Sustainability of the Project is relatively high as evidenced by the following factors.

4-5-1. Policy aspect

Sustainability of the Project in terms of policy aspect is high.

[+] Water, Sanitation and Hygiene sector development through capacity building of human resources remains to be an important development agenda for Sudan as explained in 4-1-1. In line with federal and state strategies, DWSU and DWST as well as PSWCs developed various plans relevant to human resources development, O&M of water yards, and monitoring to meet the on-sites needs of water facilities with feasible timeframe and inputs as listed below. Although the existing state strategies were developed in the past without constant monitoring data, through the Project, PSWCs have prepared action plan for rehabilitation of water yards in the locality level based on the results of monitoring activities conducted for the localities set as the model sites.

Category	Organization	Relevant plan developed
(1) Human Resources Development	DWSU/DWST	Mid-term/Long-term Human Resources Development Plan. March 2015
	Sennar SWC	Sennar SWC Training Center Action Plan (2015-2018)
	White Nile SWC	White Nile SWC Training Center Action Plan (2015-2018)
(2) O&M of water facilities	Sennar SWC	Sennar State SWC Monitoring Follow-up and Evaluation Unit Action Plan – Water Yard Rehabilitation (2015-2016). February 2015
	White Nile SWC	White Nile State SWC Monitoring Follow-up and Evaluation Unit Action Plan – Water Yard Rehabilitation (2015-2016). February 2015
(3) Monitoring (Training, O&M of Water Yards)	Sennar SWC	Sennar SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014
		Sennar SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014
	White Nile SWC	White Nile SWC Monitoring Plan– Human Resources Development (Training) (2014-2015). November 2014
		White Nile SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014

4-5-2. Institutional aspect

Sustainability in terms of institutional aspect is high.

(1) Human Resources Development through training centers

- [+] If the "Mid-term/long-term human resources development plan 2012-2026" is approved by MoHRD, it is expected that DWSU and DWST will be able to increase sustainability of the Project effects. It is also essential to actualize this plan in terms of retaining trained staff members in their organizations for long-term by improving administrative management.
- [+] Both PSWCs have strong will of continuation and expansion of their training center activities. For the implementation of training center action plan for 2015-2018, sufficient number of course coordinators

were allocated to cover different topics of the course as shown in Annex 2-6.

(2) O&M of water facilities

- [+] Both PSWCs have recognized improvement of O&M quality at sector/locality level as a result of training activities. By mobilizing trained staff members and machinery and equipment provided through the Project, it is possible to continue improvement of O&M of water yards.
- [+] As explained in 3-6-3, development of databases has been progressive for management in O&M status for water yards and alarming system for rehabilitation needs in Shinga sector office of Sennar SWC and Great Medani locality office in Gezira SWC.

(3) Monitoring of water yards

- [+] DWSU and PSWCs recognize necessity of introducing monitoring system for water yards in order to manage O&M in efficient manner and to grasp the needs on sites accurately and timely. As indicated in the monitoring manual for water yards, it is feasible for monitoring & evaluation department/unit members to conduct monitoring activities by coordinating with operators at water yards and sector/locality office technical and management staff.

4-5-3. Financial aspect

Sustainability of the Project in terms of financial aspect is relatively high.

(1) Human Resources Development through training centers

- [+] DWST and PSWCs have constantly secured budget for training activities every year throughout the Project as indicated in Annex 2-7. Both PSWC training centers have prepared action plan for the next 3 year. However, disbursement of annual budget is highly depend on financial condition of federal government for DWST and state government and water tariff revenue for PSWCs.

(2) O&M of water facilities

- [+]&[-] SWCs depend on water tariff revenue from which O&M costs are generated by each sector/locality. Therefore, common challenges are remained for all SWCs in how to reduce the costs of O&M by timely monitoring & early detection of problems with equipment and machinery of the water facilities.
- [+] Good practices can be seen in some SWCs. Kassala SWC has been planned to revise the urban water tariff[41] in order to generate financial resources for maintenance of water facilities and secure human resources for rural water supply services management. In Shinga sector office of Sennar SWC and Wad Medani sector office in Gezira SWC, where databases were developed to monitor consumption of electricity and fuel for operating water yards and clients' data with water tariff collection, it has been improvement in efficiency of financial management.
- [-] On the other hand, it has been common challenges for all SWCs to secure budget for upgrading old facilities and equipment and capital development, which normally funded by state government and federal government accordingly.

(3) Monitoring of water yards

- [-] According to the PSWCs, costs of monitoring costs by operators and locality staff are managed by sector/locality offices. Regarding the costs for logistics for monitoring & evaluation staff and locality staff, they anticipate difficulties to outreach all the water yards that are mostly in remote areas in the vast extent of land due to insufficient vehicles as mentioned in 4-3-2 as well.

4-5-4. Technical aspect

Technical aspect is relatively high.

[41] Urban tariff was set based on costs estimated through monitoring the meters set up in some points.

(1) Human Resources Development through training centers

- [+] C/Ps of DWST and PSWCs are confident about training management strengthened by the Project and they are willing to continue practicing tools and methods with utilization of the manuals and equipment introduced by the Project. Through Phase 1 and Phase 2, DWST became the main center of the training human resources in the water supply sector in Sudan. It is expected that DWST will be able to scale up their performance in dissemination of advance skills and techniques.
- [-] It is still essential for non-pilot SWCs to gain capacity of training implementation management through receiving technical support by DWST and PSWCs.

(2) O&M of water facilities

- [+] In order to upgrade human resources for advance technology installed in new water supply facilities in Sudan, DWST takes initiative in introducing new technology to their training courses such as Programmable logic controllers (PLC), SCADA, 2D Geo-Electrical imaging and solar energy system.

(3) Monitoring of water yards

- [-] At the pilot state level, in order to maximize the effect of training and link to the quality O&M of water supply facilities, C/Ps in PSWCs recognize that further technical supports are in needs for monitoring activities as well as technical training activities in O&M of water supply facilities.

4-5-5. Hindering factors

- [-] Stability in security condition of Darfur states, South Kordofan state and Blue Nile state are essential for sustainability of the project impacts.

5. CONCLUSION

The Project has successfully been implemented so far although there were several internal and external factors occurred on the way and is expected to achieve its outputs fully by the end of the Project period.

Relevance of the Project is high because the objectives of the Project are consistent with strategy of Government of Sudan and the Government of Japan in the human resources development in the water supply sector in Sudan. Project design & selection of the target groups are in line with the needs of human resources development of the water supply sector utilizing the Japanese technical expertise.

Effectiveness of the Project is evaluated high since the achievement level of Project Purpose is high. Although there was constraint associate with unstable security condition in Darfur and South Kordofan and Blue Nile states, the Project was able to manage delivering the training activities for SWCs staff from these areas by inviting them in DWST and PSWCs as well as dispatching to Morocco training.

Efficiency of the Project is relatively high with high achievement level of outputs associated with various contributing factors such as active roles of DWST, PSWCs and other SWCs staff who were trained in Phase 1 as well as OJT for technical training courses, and collaboration among stakeholders. However, due to the delay in establishment of monitoring & evaluation department/units, there have been delay in monitoring activities for O&M of water yards.

Impact of the Project is evaluated moderate because of the unlikeliness of achievement of the Overall Goals within three to five years after the Project completion. Although the Project Purpose has been achieved, it is still required that various external factors to be fulfilled to achieve the Overall Goal: "Water supply system is properly managed in Sudan."

Sustainability of the Project is relatively high because of high policy & institutional aspect and relatively high financial and technical aspect. Especially, common challenges are remained for PSWCs to involve all the operators and sector/locality offices and make the monitoring system function to cover all water yards and then to utilize the monitoring results for development of the O&M and rehabilitation plan for all localities.

Now DWSU, DWST and SWCs are expected to take initiative for continuing these activities by taking the following recommendations into account.

6. RECOMMENDATION AND LESSONS LEARNED

6-1 Recommendations

The Joint Terminal Evaluation Team recommends that the following actions be taken so that the outcomes of the Project will be utilized and sustained after the Project.

6-1-1. Recommendations for the activities until the end of the Project Period

In order to secure the achievement of the Project, recommendations are made as follows.

(1) Approval process of "Mid-term/Long-term Human Resources Development Plan 2012-2026"

In order to ensure the implementation of the "Mid-term/Long-term Human Resources Development Plan 2012-2026", it shall be approved by MoHRD by the end of June 2015.

(2) Disclosure of information about DWST training program through website

Since international organizations working in the water supply development are interested in utilizing DWST training courses to build the capacities of beneficiaries targeted in their programs/projects, it is recommended for DWST to launch the website (and some communication tools) by the end of June 2015 to release the announcement of annual training course schedule with syllabus of each course. It is also essential for DWSU to assign the person in charge of the website management. For DWST, it is recommended to develop independent financial sources such as through promoting training courses for the private sector, universities, institutions and even for other directorates in MoWRE.

(3) Implementation of the Monitoring Plan (Water yards)

There is remaining a certain amount of activities for monitoring of water yards in Output 3. Those remaining activities need to be completed according to the "Sennar SWC Monitoring Plan – Water Supply Facility (Water Yard)" and "White Nile SWC Monitoring Plan – Water Supply Facility (Water Yard)."

(4) Final Seminar for sharing the Project Outputs

The Final Seminar shall be held to aim at sharing the Project Outputs among stakeholders including SWCs and international organizations by the end of the Project period. Main Project Outputs to be shared in the Seminar are the approved "Mid-term/Long-term Human Resources Development Plan 2012-2026," the disclosure system of training program, and the monitoring system of water yards.

(5) Establishing the steering committee for Joint Seminar

For DWSU, DWST and SWCs, it will be beneficial to continue Joint Seminar regularly to promote human resources development at state level and scale up the water supply sector in Sudan. It is recommended to form the steering committee for the Joint Seminar. The steering committee is expected to coordinate among different SWCs and stakeholders in the water development sectors and to plan for seminar programs such as

introducing good practices (e.g. adopting databases for management in locality level in Gezira and Sennar states as mentioned in 3-6-3 (4)). It is beneficial for all participants to learn from good practices during the seminar.

6-1-2. Recommendations for the activities after the completion of the Project

In order to secure the sustainability of the Project and fill the gap to achieve the overall goal, recommendations are made as follows.

(1) Technical support to SWCs for strengthening of training management system

It is expected for DWST and PSWCs to provide technical support for building training management system for other SWC training centers. It is also recommended for DWSU and DWST to create the lending system of tools and equipment for training courses in SWCs by mobilizing available tools and equipment among SWCs.

(2) Reflecting the monitoring results to the strategic plan

After completing monitoring activities, SWCs are expected to reflect monitoring results to the next WASH strategic plan 2017-2021[42].

(3) Introducing the monitoring system to other SWCs and other types of water facilities

It is also recommended for PSWCs to expand monitoring activities to cover other water facilities besides water yards such as pipe network and water treatment plants, hand pumps etc. in order to improve O&M. Moreover, it is recommended to introduce this monitoring system to other states with cooperation with SWCs and stakeholders including international organizations.

(4) Continuation of the technical cooperation with Morocco

Training in Morocco as well as dispatch of Moroccan experts to Sudan were one of the most effective activities that widen the perspectives of Sudanese C/Ps. Thus, for DWSU and SWCs, it is recommended to continue the technical cooperation with the Moroccan authorities in order for Sudan to improve water supply sector with sound policy, regulations and strategy.

(5) Establishment of the new Kilo Ten Training Center

Likewise the recommendation at the time of mid-term review, it is expected for DWSU to solve the issues for the construction of the new Kilo Ten training center as soon as possible. Once the new training center is constructed, it is necessary to allocate additional human resources and strengthen the training implementation framework for scaling up and to be the model center in the East African region.

6-2. Lessons Learned

As explained in 3-6-1, in order to increase ownership of the C/Ps for the Project, the following methods were proved for maximizing their effectiveness.

- Learning from experiences of Morocco in the water supply sector which have similarities with Sudan
- Award system for the best trainees and best training center to encourage C/Ps for further improvement of their organizations associated with increasing their sense of ownership
- Joint seminar hosted in various states for sharing information and experiences among SWCs and other stakeholders in water supply development

[42] According to UNICEF Sudan, progress of WASH strategic plan 2011-2015 will be assessed at every state by DWSU with technical support by UNICEF in 2015. The results of the assessment will be reflected to design of the next WASH strategic plan 2016-2021 (Source: UNICEF Sudan, 20150309).

ANNEXES

ANNEX 1: PDM (Version 5.0)

Project title: Project for Human Resources Development for Water Supply Phase 2
Duration : November, 2011～September, 2015
Implementation Agency : DWSU
Target area : 18 States in Sudan*
Target groups : DWSU, DWST, SWCs

Narrative Summary	Objectively Verifiable Indicators	Means of Verifications	Important Assumptions
< Overall Goal > Water supply system is properly managed in Sudan.	SWC staff utilizes their knowledge and technical skills to maintain and operate water supply facilities.		1. Sudan's policies for human resources development for water supply does not change drastically. 2. Trainings are implemented continuously in SWCs.
< Project Purpose > Human resources in water supply sector are properly trained in Sudan.	1. The number of trainees that are trained in Sudan exceeds 2000. 2. The number of annually maintained water yards** is increased to more than 20 in each PSWC.	1. DWST, PSWC, SWCs training implementation report 2. PSWC training implementation report	1. PSWC's staff who completed training courses do not leave SWC. 2. There are no climate changes or disasters that affect the operations water facilities. 3. Necessary budget, personnel, equipment, etc. are provided in SWC at the appropriate timing.
< OUTPUTS > 1. Training courses are implemented by DWST based on its midterm/long-term human resources development plan.	1. Mid-term/long-term human resources development plan is completed by March 2013. 2. Percentage of contributions from training coordinator on the planning and implementation of training courses increases by 100%. 3. Training courses at DWST are implemented more than 20 times annually.	1. Mid-term/long-term human resources development plan 2. DWST training coordinator questionnaire Japanese expert questionnaire 3. DWST training implementation report	1. Necessary budget, personnel, equipment, etc. are provided in a timely and appropriately.
2. Training course implementation structures in PSWCs are developed by PSWCs in collaboration with DWST.	1. Percentage of contributions from training coordinators on the planning and implementation of training courses is increased by 80% in the PSWCs 2. Training courses are implemented according to the SWC training implementation plan.	1. PSWC training coordinator questionnaire Japanese expert questionnaire 2. PSWC training implementation report	
3. Monitoring system is established within DWSU and pilot SWCs for training course implementation and O&M of water supply system of PSWCs.	1. Monitoring manual is completed by March 2015. 2. Monitoring activities are implemented according to schedule.	1. Monitoring manual*** 2. Monitoring report	
4. Training course implementation structure is developed within each SWC in Sudan in collaboration with DWST.	1. Human resources development manual is completed by March 2015. 2. Joint Seminar to share and disseminate the outputs of PSWCs are implemented 6 times.	1. Human Resources Development Manual 2. Joint Seminar report	
< ACTIVITIES > 1-1. DWST elaborates draft plan for mid-term/long-term human resource development. 1-2. DWST prioritizes actual needs for the training courses. 1-3. DWST elaborates its training implementation plan based on the draft plan for midterm/long term human resource development.		< INPUTS > 1. Japanese side (1)Experts ①Team leader/training course management/water supply plan	1. Budget of DWSU, DWST, and SWCs does not drastically decrease. 2. Organizational restructuring does not occur for counterparts.

1-4. DWST implements training courses based on the training course implementation plan. 1-5. DWST evaluates the training courses. 1-6. DWST revises training course contents, textbooks and manuals based on the evaluation results of the training courses. 1-7. DWST improves its capacity responding to the expansion of training center. 1-8. DWST finalizes the mid-term/long-term human resources development plan, which is to be authorized by the government of Sudan. 2-1. DWST strengthens its leadership through the support of below activities of SWC. 2-2. PSWCs establish training units within the organization. 2-3. PSWCs develop the draft SWC activities plan. 2-4. PSWCs prioritize actual needs for the training courses. 2-5. PSWCs develop training course implementation plan based on the priority. 2-6. PSWCs' training units develop training course curriculum (including OJT in Localities) and textbooks. 2-7. PSWCs' training units implement training courses. 2-8. PSWCs' training unit evaluate the training courses. 2-9. PSWCs' training units revise training course curriculum and textbooks based on the evaluation results of the training courses. 2-10. PSWCs reflect the monitoring result of draft SWC activities plan to training course implementation plan. 3-1. DWSU and PSWCa establish monitoring units within the organization. 3-2. DWSU develops the draft version of monitoring manual to be used by PSWCs. 3-3. PSWCs implement baseline survey on the O&M status of current water supply system. 3-4. PSWCs regularly monitor the current situation of training implementation, examples identified in the State, and O&M of water supply system based on the draft of monitoring manual. 3-5. DWSU and DWST analyze and evaluate the monitoring result and give feedbacks such as lessons learned and good practices etc. to SWC monitoring unit. 3-6. DWSU maintains and manages monitoring data at information center. 3-7. DWSU finalizes monitoring manual based on the evaluation of monitoring of training courses and O&M of water supply system. 4-1. Each SWC (excluding PSWCs) establishes training unit within the organization. 4-2. DWST develops Human Resources Development Manual to each SWC based on the outputs of 1, 2 and 3. 4-3. DWST implements Joint Seminar(s) to share and disseminate the outputs of PSWCs' activities, and distribute Human Resource Development Manual to each SWC. 4-4. Each SWC (excluding PSWCs) develops training course implementation plan.	②Organizational management/Water tariff management ③Water supply facilities management (Water treatment plant/Pipe network management) ④Machinery and electric equipment/Equipment management ⑤Well management ⑥Data management/Monitoring ⑦Water quality control and management ⑧Community development ⑨Sanitation management (2)Equipment ①Necessary equipment for DWST new training courses ②Necessary equipment for PSWCs training courses ③Necessary equipment for other SWCs (excluding Darfur 5 States, South Kordofan, West Kordofan, Blue Nile, Kassala and Khartoum States) (3)Project activities fee (4)Training in Morocco (5)Acceptance Trainee from Morocco 2. Sudanese side (1)Allocation of counterparts and administrative personnel 1) Project Director 2) Project Manager 3) Counterparts (2)Allocation of land, buildings and facilities 1) Office space for Japanese experts in the building of DWSU 2) Office space for JICA experts in the building of PSWCs 3) Training space in DWST and PSWCs 4) Other necessary facilities, equipment and materials for the administration of the Project (3)Project activities fee (4)Construction of kilo ten training center (5)Procurement of office equipment and furniture for the training center	3. The number of trained SWC staff leaving the organization is not significant. 4. Budget, human resources, and necessary equipment for project implementation are properly provided. <Pre-Condition> 1. The economic situation does not worsen than that of initiation period of project implementation. 2. Political conflicts do not occur 3. Organization (personnel) and budget at DWSU, DWST and SWC does not change drastically.

<Remarks>
DWSU: Drinking Water and Sanitation Unit, DWST: Drinking Water and Sanitation Training Center, PSWC: Pilot State Water Corporation, SWC: State Water Corporation, O&M: Operation and Maintenance
* Project activities are conducted indirectly in areas that are inaccessible for Japanese side.
**Water yard is consisting of borehole, elevator tank, generator house and public fountains.
***Monitoring manual includes the guideline of monitoring activities, the mandate of monitoring unit, the monitoring activity schedule and the reporting schedule from SWC and DWSU.
This manual is used for the monitoring of SWC training course implementation, good practices and lessons learnt which are shared with other SWCs, and maintenance of water supply facilities in SWC.

ANNEX 2: Inputs to the Project

2-1 Placement Records of Japanese Experts

Name	Fields of expertise	Period dispatched to Sudan	M/M
Mr. Mitsuro Uemura	Leader/Training Plan Water Supply Plan 1	2011.11.12 – 2012.07.11	8.10 (Year 1)
		2012.10.06 – 2013.05.05	7.07 (Year 2)
		2013.10.07 – 2014.05.31	7.90 (Year 3)
Mr. Jun Onodera	Deputy Project Leader Organizational Management Water Tariff Management	2012.04.01 – 2012.06.20	2.70 (Year 1)
		2012.10.17 – 2012.12.16	2.03 (Year 2)
		2013.10.25 – 2013.12.23	2.00 (Year 3)
		2014.10.10 – 2014.12.26	2.60 (Year 4)
		2015.01.25 – 2015.04.15*	1.17+1.53(Year 4)*
		2015.08.06 – 2015.09.10*	1.20 (Year 4)*
Mr. Hiroyoshi Yamada	Training Facility Management Water Supply Plan 2	2014.12.20 – 2015.01.20	1.40 (Year 4)
		2015.08.12 – 2015.09.10*	0.67 (Year 4)*
Mr. Yusuke Oshika	Well Management	2012.03.12 – 2012.07.11	4.07 (Year 1)
		2013.01.04 – 2013.04.05	3.07 (Year 2)
		2013.11.21 – 2014.02.18	3.00 (Year 3)
		2015.01.08 – 2015.03.09*	1.73+0.30 (Year 4)*
Mr. Makoto Yamamoto	Water Supply Facility (Treatment Plant/Pipe Network)	2012.05.23 – 2012.07.11	1.67 (Year 1)
		2013.02.18 – 2013.05.03 2013.10.07 – 2012.11.20	2.50 (Year 2)
		2014.02.01 – 2014.03.17	3.00 (Year 3)
		2014.11.29 – 2015.01.18	1.70 (Year 4)
Mr. Ryoichi Kimura	Electricity/Mechanics/Equipment Management	2011.11.12 – 2012.05.11	6.07 (Year 1)
		2012.10.06 – 2013.02.02	4.00 (Year 2)
		2013.11.21 – 2014.03.10	3.67 (Year 3)
		2014.10.10 – 2014.12.06	1.93 (Year 4)
		2015.02.23 – 2015.03.31*	0.20+1.04 (Year 4)*
Mr. Tadashi Sato	Data Management/Monitoring	2011.11.12 – 2012.01.11	6.07 (Year 1)
		2012.03.12 – 2012.07.10 2012.10.17 – 2012.12.16	2.03 (Year 2)
		2013.10.07 –2013.11.20 2014.01.05 – 2015.02.07	2.63 (Year 3)
		2014.10.10 – 2014.11.16 2015.01.12 – 2015.02.18	2.53 (Year 4)
Mr. Shunsaku Matsuo	Management of Water Quality	2011.11.12 – 2012.03.11	4.03 (Year 1)
		2012.10.06 – 2012.12.05	2.03 (Year 2)
		2014.03.20 – 2014.05.01	1.43 (Year 3)
		2014.12.03 – 2015.01.12	1.37 (Year 4)
Mr. Arata Sasaki	Community Development	2012.04.01 – 2012.05.31	2.03 (Year 1)
		2013.03.22 – 2013.05.05	1.50 (Year 2)
		2014.04.11 – 2014.05.31	1.70 (Year 3)
		2015.01.12 – 2015.02.10	1.00 (Year 4)
Ms. Aya Kadokami	Sanitation Management	2013.11.15 – 2014.02.04	2.73 (Year 3)
		2014.10.20 – 2014.11.18	1.00 (Year 4)
		2015.08.01 – 2015.09.10*	1.37 (Year 4)*
Planned M/M (Total) : Year 1 (34.73M/M) + Year 2 (24.33M/M) + Year 3 (28.17M/M) + Year 4 (21.61M/M)			108.74
Actual M/M (Total) as of the end of February 2015 : Year 1 (34.73M/M) + Year 2 (24.33M/M) + Year 3 (28.17M/M) + Year 4 (15.50M/M: excluding 1.13M/M covered by Earth System Science Co., Ltd.)			102.63
***M/M left as of 28 February 2015**			6.11

ANNEX 2: Inputs to the Project

2-2. List of Moroccan Experts

Name	Organization	Position	Fields of expertise
The 1st Mission (2012.12.08-2012.12.17)			
Mr. Outair Abdelouahed	National Water Corporation (ONEP)	Head of water treatment division	Monitoring the quality of raw and treated water (Production and distribution)/ Training at the ONEP training center/ Technical assistance in quality control, plants performance diagnosis and training/ Writing manual and procedures of water treatment plant monitoring
Mr. Abderrafii Mardi		Director of training department	Training need assessment/ Training planning/ Training programs implementation/ Consultation of capacity building programs for the benefit of ONEE, and other institutions in morocco or abroad
Mr. Mohamed Laaouan		Head of pedagogical development	Water treatment/ Water quality/ Water sanitation/ Training/ Trainer
Dr. Mustapha Mahi		Responsible in R&D development	Sanitation & environment
Mr. Hilali Jawad	National Drinking Water and Electricity Corporation in Morocco (ONEE)	Head of cooperation division	Cooperation management and planning/ Capacity building programs/ Financial management/ HR
The 2nd Mission (2013.12.13-2013.12.21)			
Mr. Nrhira Abdessadek	The Hydraulic Agency of South Massa-Basin in Morocco (ABHSMD)	Director of water resource development	Water resources development/ Water resources management
Mr. Driss Ben Abdellah	ONEE	Director of water supply facility	Drinking water supply/ Utilization of water
Mr. Ahamed Garbaoui		Director of urban water supply	Urban water supply
Dr. Mahmoud Fafsi		Director of technical development	Desalinization of sea water
The 3rd Mission (2014.12.13-2014.12.18)			
Mr. Samir Bensaid	International Institute of Water and Sanitation affiliated to ONEE, the National Company for Electricity and Potable Water in Morocco	Director General	Policy making/ Strategic management/ Water law
Mr. Zerouali Abdelaziz	Hydrolic Basin Agency of Bouregreg and Chaouia (ABHBC), Ministry of Water, Mining, Energy and Environment	Director General of River Basin of Bouregreg	Policy making/ Strategic management/ Water law

ANNEX 2: Inputs to the Project

2-3 List of participants of counterpart training in Morocco

	Name	Position at the time of the training	Period	Theme	Training institutions
1	Mr. Ibrahiem E.M.Bashari	PWC	2012.03.18 – 2012.03.29	The target persons of this Study Tour were the staff of each SWC, who had never been to the foreign countries and were satisfied with the current situation of Sudan. Through this Study Tour, they were expected to consider their own problems from the foreign perspective and to promote their self-efforts.	1. National Drinking Water and Electricity Supply Corporation (ONEE) 2. Ministry of Water 3. Hydraulic Basin Office of Tenshift (ABHT) 4. Quarzazate prefecture 5. Tata prefecture 6. Hydraulic Basin Office of Sus Massa Darra (ABHSMD) 7. RADEEMA 8. RAMSA 9. ONEP, Agadir
2	Mr. Nassir Mukhtar Ali	Sennar SWC			
3	Mr. Abdalla Abbas Hamid	Sennar SWC			
4	Mr. Elabaid Musa Ajeep	White Nile SWC			
5	Mr. Adam M.Bushra	White Nile SWC			
6	Mr. Mohammed M.Yagoub	North Darfur SWC			
7	Mr. Alfaki M. Hassan M.	West Darfur SWC			
8	Mr. Mohammed H. Adam	South Darfur SWC			
9	Mr. Eltaief Abass M.A.M	Blue Nile SWC			
10	Mr. Hamid A. Ibrahim M.	South Kordofan SWC			
11	Mr. Hussein S.Ahmed	Kassala SWC			
12	Mr. Ahmed A. Elamin	Kassala SWC			
13	Mr. M.Abdallah Ahamed	Kassala SWC			
14	Mr. Egbal B.Alamir	DWST	2013.04.06 – 2013.04.14	Training was prepared for various themes by ONEE. Trainees visited at the water treatment plant supported by the Japanese loan project in Fes.	1. ONEE 2. ONEE, Fes
15	Mr. Ahmed Eltayeb	White Nile SWC			
16	Mr. Jalal Bosheer	Sennar SWC			
17	Ms. Batoul Saad A.Faggad	El Gezira SWC			
18	Mr. Sabir Abd Ellatif M.	Northern SWC			
19	Mr. Waleed Mahgoub	River Nile SWC			
20	Ms. Atega Eshag Rahimt Alla	Khartoum SWC			
21	Mr. Mawui Adam	North Kordofan SWC			
22	Mr. Sulaiman Hassan	North Darfur SWC			
23	Mr. A. Adam Deffaalla	West Darfur SWC			
24	Mr. Aldoma Adam Osman	South Darfur SWC			
25	Mr. Mr.El Y.Abdelmumen	South Kordofan SWC			
26	Mr. Ehab Yousif Mekki	Blue Nile SWC			
27	Ms. Tawasul Mohammed Ali BABEKER	DWST	2014.04.05 – 2014.04.13	Trainees were expected to understand the contents of IWRM (Integrated Water Resources Management), drip irrigation, wastewater recycling and the water supply situation in the Agadir area in southern Morocco. It was expected for them to transfer the above knowhow to the Sudan side.	1. ONEE 2. Ministry of Water 3. ABHSMD 4. ONEE, Agadir
28	Mr. Alwaleed Fathi Obaid SALIM	Northern SWC			
29	Mr. Khalid Abdallah Saeed FADLALLAH	River Nile SWC			
30	Mr. Osman Hamid Osman HAMID	Red Sea SWC			
31	Mr. Sami Omer Elamin MOHAMED	El Gezira SWC			
32	Mr. Dafaalla Eltayeb Mohamed MASOUD	Hawata Water Corporation			
33	Mr. Ammar Hassan Rahamtalla MOHAMMED	Sennar SWC			
34	Mr. El Tayeb Kabashi Abdallah IBRAHIM	White Nile SWC			
35	Mr. Muataz Hassab Elrasoul Abdalla MOHAMMED	Kassala SWC			
36	Mr. Abdalhamed Hamed Mohammed Hassan AHMED	Kassala SWC			
-	To be decided	DWST and SWCs	2015.03-04 (Plan)	Management of filtration facilities and equipment	ONEE

ANNEX 2: Inputs to the Project

2-4 Local costs from Japanese side

(1) Local operational costs

In Sudanese Pound

Item	Year 1 (2011.11 -2012.8)	Year 2 (2012.10 -2013.6)	Year 3 (2013.9 - 2014.7)	Year 4 (2014.9 - 2015.10)	Total
Local Activity Cost	228,177	855,935	889,768	1,144,586	3,118,466

(Unit: SDG)

In Japanese Yen

Item	Year 1 (2011.11 -2012.8)	Year 2 (2012.10 -2013.6)	Year 3 (2013.9 - 2014.7)	Year 4 (2014.9 - 2015.10)	Total
Local Activity Cost	6,514,000	15,186,000	19,913,000	20,994,000	62,607,000

(Unit: JPY)

Note:

- Figure for the Year 1, 2 & 3 are disbursement amount. Year4 is the budget plan by the end of the Project
- JPY amounts are converted to SDG amounts using following exchange rates:
  JPY28.548/SDG (official exchange rate in November 2011) for Year 1,
  JPY17.742/SDG (official exchange rate in October 2012) for Year 2,
  JPY22.380/SDG (official exchange rate in September 2013) for Year 3,
  JPY18.342/SDG (official exchange rate in September 2014) for Year 4.

(2) Equipment costs provided for the Project

In Sudanese Pound:

Item	Year 1 (2011.11 -2012.8)	Year 2 (2012.10 -2013.6)	Year 3 (2013.9 - 2014.7)	Year 4 (2014.9 - 2015.10)	Total
Equipment provided	7,884,448	424,304	533,110	38,436	8,880,298

(Unit: SDG)

In Japanese Yen:

Item	Year 1 (2011.11 -2012.8)	Year 2 (2012.10 -2013.6)	Year 3 (2013.9 - 2014.7)	Year 4 (2014.9 - 2015.10)	Total
Equipment provided	225,085,213	7,528,000	11,931,000	705,000	245,249,213

(Unit: JPY)

Note:

- Figure for the Year 1, 2 & 3 are disbursement amount. Year 4 is the budget plan by the end of the Project.
- JPY amount is converted to SDG amount using following exchange rates: JPY28.548/SDG (official exchange rate in November 2011) for Year 1, JPY17.742/SDG (official exchange rate in October 2012) for Year 2, JPY22.380/SDG (official exchange rate in September 2013) for Year 3, and JPY18.342/SDG (official exchange rate in September 2014) for Year 4.
- There is a difference between the figures for the cost of equipment mentioned here (8,880,298 SDG, 245,249,213 JPY) and those shown in ANNEX 2-5 (8,455,461 SDG), which is caused by differences in exchange rates used for calculation. The former are calculated with JICA's official monthly exchange rates of the beginning of each Project Year. In Annex-2-5, the following exchange rates are used for items purchased in USD & JPY to calculate SDG equivalent amounts (USD2.88/SDG, JPY28.64/SDG in 2012).

2-5 List of equipment procured under the Project

Note:

- Condition/Usage = C, Good = O, Some challenges = △(according to the reporting by each organization)
- Year/Month of Procurement months: 2012 June (No. 1-14, 16-39, 41-72, 76-78), 2013 December (No. 15), 2013 October (No. 40, 80-83), 2013 March (No. 73-74), 2014 April (No. 75)
- Following exchange rates are used for items purchased in USD & JPY to calculate SDG equivalent amounts (@USD2.88/SDG, JPY28.64/SDG in 2012).

1. Equipment for maintenance training	SDG	DWST			Sennar			White Nile			Northern			Nile			El Gezira			Gedaref			Red sea			North Kordofan		
1-1.Water well management	Unit Price	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C
1) Truck with 3t crane	316,800	1	316,800	△	1	316,800	O	1	316,800	O	0	0		0	0		0	0		0	0		0	0		0	0	
2) Pickup car(double cabin)	76,896	1	76,896	O	2	153,792	O	2	153,792	O	0	0		0	0		0	0		0	0		0	0		0	0	
3) Submersible Pump Unit (9.2kw)	35,355	0	0		1	35,355	O	11	388,904	O	1	35,355	O	0	0		1	35,355	O	0	0		0	0		1	35,355	O
4) Submersible Pump Unit (5.5kw)	34,318	0	0		10	343,181	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0	
5) Diesel Generator(17KVA)	26,676	0	0		10	266,760	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0	
6) Diesel Generator(30KVA)	35,050	0	0		1	35,050	O	11	385,546	O	1	35,050	O	0	0		1	35,050	O	0	0		0	0		1	35,050	O
7) Pumping Test Unit (100m)	12,110	0	0		1	12,110	O	1	12,110	O	1	12,110	O	0	0		1	12,110	O	0	0		0	0		1	12,110	O
8) Air Lifting Tools (150m)	24,726	0	0		0	0		1	24,726	O	0	0		0	0		0	0		0	0		0	0		0	0	
9) Air Lifting Tools (100m)	19,533	0	0		1	19,533	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0	
10) Air compressor(12bar,10m3)	165,600	0	0		1	165,600	O	1	165,600	O	0	0		0	0		0	0		0	0		0	0		0	0	
11) Borehole camera	226,955	0	0		1	226,955	O	1	226,955	O	0	0		0	0		0	0		0	0		0	0		0	0	
12) Water level indicator	2,183	0	0		2	4,366	△	2	4,366	O	1	2,183	O	1	2,183	O	3	6,549	O	1	2,183	O	1	2,183	O	1	2,183	△
13) PH/EC meter (Portable type)	9,976	0	0		1	9,976	O	1	9,976	O	1	9,976	O	0	0		1	9,976	O	0	0		0	0		1	9,976	O
14) Steel pipe (with socket)	490	0	0		50	24,480	O	50	24,480	O	0	0		0	0		0	0		0	0		0	0		0	0	
1-2.Water yard maintenance											0																	
15) Diesel Generator(12.5KVA)	24,718	0	0		1	24,718	O	1	24,718	O	0	0		0	0		0	0		0	0		0	0		0	0	
16) Mechanical tool set A	16,396	0	0		2	32,792	O	2	32,792	O	1	16,396	O	1	16,396	O	2	32,792	O	1	16,396	O	2	32,792	O	1	16,396	O
17) Mechanical tool set B	7,910	0	0		2	15,820	O	2	15,820	O	1	7,910	O	1	7,910	O	2	15,820	O	1	7,910	O	2	15,820	O	1	7,910	O
18) Electrical tool set A	8,076	0	0		2	16,151	O	2	16,151	O	1	8,076	O	1	8,076	O	1	8,076	O	1	8,076	O	2	16,151	O	1	8,076	O
19) Electrical tool set B	1,415	0	0		2	2,830	O	2	2,830	O	1	1,415	O	1	1,415	O	1	1,415	O	1	1,415	O	2	2,830	O	1	1,415	O
20) Bench vice 6"	1,200	0	0		2	2,400	O	2	2,400	O	0	0		0	0		0	0		0	0		0	0		0	0	
21) Pipe vice	2,780	0	0		2	5,560	O	2	5,560	O	0	0		0	0		0	0		0	0		0	0		0	0	
22) Pipe threading machine	27,500	0	0		1	27,500	O	1	27,500	O	0	0		0	0		0	0		0	0		0	0		0	0	
23) Welding machine	13,500	0	0		5	67,500	O	5	67,500	O	1	13,500	O	1	13,500	O	2	27,000	O	1	13,500	O	1	13,500	O	1	13,500	O
24) Diesel power welder	22,500	0	0		2	45,000	O	2	45,000	O	0	0		0	0		1	22,500	O	0	0		0	0		1	22,500	△
25) Torque wrench	2,000	0	0		1	2,000	O	1	2,000	O	0	0		0	0		0	0		0	0		0	0		0	0	
26) Electrical drill set	1,750	0	0		1	1,750	O	1	1,750	O	0	0		0	0		1	1,750	O	0	0		0	0		1	1,750	O
27) Multi meter (Clamp meter)	900	0	0		2	1,800	O	2	1,800	O	1	900	O	1	900	O	1	900	O	1	900	O	1	900	O	1	900	O
28) Equipment setting tools	8,425	0	0		2	16,850	O	2	16,850	O	1	8,425	O	0	0		1	8,425	O	0	0		0	0		1	8,425	O
29) Electric disc sander	1,250	0	0		5	6,250	O	5	6,250	O	0	0		0	0		0	0		0	0		0	0		0	0	
30) Electrical cutting machine for Iron	2,500	0	0		5	12,500	O	5	12,500	O	1	2,500	O	0	0		1	2,500	O	0	0		0	0		1	2,500	O
31) Electric impact wrench	900	0	0		2	1,800	O	2	1,800	O	0	0		0	0		0	0		0	0		0	0		0	0	
32) Electrical Cable set	185	0	0		5	925	O	5	925	△	0	0		0	0		0	0		0	0		0	0		0	0	
33) Three jaw puller	900	0	0		5	4,500	O	5	4,500	O	0	0		0	0		0	0		0	0		0	0		0	0	
34) Two jaw puller	850	0	0		5	4,250	O	5	4,250	O	0	0		0	0		0	0		0	0		0	0		0	0	
35) Gear and bearing puller	750	0	0		5	3,750	O	5	3,750	O	0	0		0	0		0	0		0	0		0	0		0	0	
36) Battery chargers	950	0	0		5	4,750	O	5	4,750	O	0	0		0	0		0	0		0	0		0	0		0	0	
37) Tap and Dies set	1,500	0	0		5	7,500	O	5	7,500	O	0	0		0	0		0	0		0	0		0	0		0	0	
38) Gas welding tool	2,300	0	0		1	2,300	O	1	2,300	O	0	0		0	0		0	0		0	0		0	0		0	0	
39) Electric Motor	450	1	450	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
40) Clamp meter	615	0	0		1	615	O	1	615	O	0	0		0	0		0	0		0	0		0	0		0	0	
1-3.Pipe network																												
41) HDPE welding Machine	56,290	0	0		1	56,290	O	1	56,290	O	1	56,290	O	0	0		1	56,290	O	0	0		0	0		1	56,290	△

2. Equipment for survey and analysis trainin	SDG	DWST			Sennar			White Nile			Northern			Nile			El Gezira			Gedaref			Red sea			North Kordofan		
2-1.Water quality management	Unit Price	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C	Qty	Price	C
42) Bromate measurement system	418,406	1	418,406	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
43) Digital bullet	3,732	0	0		3	11,197	O	3	11,197	O	1	3,732	O	1	3,732	O	5	18,662	O	1	3,732	O	1	3,732	O	1	3,732	O
44) PH/EC meter (Bench type)	12,586	0	0		1	12,586	O	1	12,586	O	1	12,586	Δ	1	12,586	Δ	2	25,171	O	1	12,586	O	1	12,586	O	1	12,586	O
45) Turbidity meter	16,756	0	0		1	16,756	O	1	16,756	O	1	16,756	O	1	16,756	Δ	1	16,756	O	1	16,756	O	0	0		1	16,756	O
46) Spectrophotometer DR5000	52,272	0	0		0	0		0	0		1	52,272	O	1	52,272	O	1	52,272	O	1	52,272	O	1	52,272	O	1	52,272	O
47) Reagent for HACH Spectrophotometer	2,497	0	0		2	4,994	O	2	4,994	O	1	2,497	O	1	2,497	O	1	2,497	O	1	2,497	O	1	2,497	O	1	2,497	O
48) Media of Bacteology analysis	1,559	0	0		1	1,559	O	1	1,559	O	1	1,559	O	1	1,559	O	1	1,559	O	1	1,559	O	1	1,559	O	1	1,559	O
49) Sterilized membrane filter	644	0	0		1	644	O	1	644	O	0	0		0	0		1	644	O	1	644	O	1	644	O	1	644	O
50) Sterilized pad thickness	741	0	0		1	741	O	1	741	O	1	741	O	1	741	O	1	741	O	1	741	O	1	741	O	1	741	O
51) Residual chlorine tester	4,821	0	0		1	4,821	O	1	4,821	O	0	0		0	0		0	0		0	0		0	0		0	0	
52) Dissolve oxygen tester	11,730	0	0		1	11,730	O	1	11,730	O	0	0		0	0		0	0		0	0		0	0		0	0	
53) Glass ware unit	8,317	0	0		1	8,317	O	1	8,317	O	1	8,317	O	1	8,317	O	1	8,317	O	1	8,317	O	1	8,317	O	1	8,317	O
54) Distillater	6,503	0	0		0	0		0	0		1	6,503	O	1	6,503	O	1	6,503	O	1	6,503	O	1	6,503	O	1	6,503	O
55) Filter paper	176	0	0		10	1,755	O	10	1,755	O	0	0		0	0		0	0		0	0		0	0		0	0	
56) Chemical Reagents	1,553	0	0		1	1,553	O	1	1,553	O	0	0		0	0		0	0		0	0		0	0		0	0	
2-2.Survey and design																											
57) Geophysical Survey Equipment	257,364	1	257,364	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
58) Auto level with tripod & staff	3,325	0	0		3	9,975	O	3	9,975	O	0	0		0	0		2	6,650	O	0	0		0	0		0	0	
3. Office equipment																											
3-1.Data management training																											
59) Computer (Lap Top)+AntiV+office	4,450	5	22,250	O	15	66,750	O	15	66,750	Δ	3	13,350	O	3	13,350	O	10	44,500	Δ	3	13,350	O	3	13,350	O	3	13,350	O
60) Computer (Desk Top)+AntiV+office	4,650	5	23,250	O	21	97,650	Δ	21	97,650	O	3	13,950	Δ	3	13,950	O	22	102,300	Δ	3	13,950	O	3	13,950	O	3	13,950	O
61) Computer server	8,900	2	17,800	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
62) Anti Virus Software (for 3 computer)	300	17	5,100	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
63) Projector (Portable type)	3,300	2	6,600	O	3	9,900	O	3	9,900	O	1	3,300	O	1	3,300	O	1	3,300	O	1	3,300	O	1	3,300	O	1	3,300	O
64) Photocopy machine Color	19,960	1	19,960	O	2	39,920	O	2	39,920	O	1	19,960	O	1	19,960	O	1	19,960	O	1	19,960	O	1	19,960	O	1	19,960	O
65) Photocopy machine Black & White	11,730	0	0		2	23,460	O	2	23,460	O	0	0		0	0		0	0		0	0		0	0		0	0	
66) Plotter A1	12,000	0	0		0	0		0	0		0	0		0	0		1	12,000	Δ	0	0		0	0		0	0	
67) Digital Video Camera	1,450	0	0		1	1,450	O	1	1,450	O	0	0		0	0		0	0		0	0		0	0		0	0	
68) Digital Camera	1,000	0	0		3	3,000	O	3	3,000	O	1	1,000	O	1	1,000	O	3	3,000	O	1	1,000	O	1	1,000	O	1	1,000	O
69) Microphone(1) + Speaker(1)	700	0	0		3	2,100	Δ	3	2,100	Δ	0	0		0	0		0	0		0	0		0	0		0	0	
70) Stabilizer	350	0	0		5	1,750	O	5	1,750	O	0	0		0	0		0	0		0	0		0	0		0	0	
71) UPS 650VA	425	5	2,125	O	10	4,250	Δ	10	4,250	Δ	1	425	Δ	1	425	O	5	2,125	O	1	425	O	1	425	O	1	425	O
72) Projector (Fix type)	3,300	3	9,900	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
73) Computer (Desk Top)+AntiV+office	3,454	0	0		0	0		0	0		18	62,169	O	11	37,992	O	0	0		0	0		10	34,538	O	15	51,808	O
74) Projector (Portable type)	2,199	0	0		0	0		0	0		1	2,199	O	0	0		0	0		0	0		1	2,199	O	1	2,199	O
75) Photocopy machine Color	13,968	0	0		0	0		0	0		1	13,968	O	0	0		0	0		0	0		1	13,968	O	1	13,968	O
3-2.DWST training management																											
76) Video camera	1,656	1	1,656	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
77) Video recording device with monitor	1,989	1	1,989	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
78) Leaser pointer	321	3	964	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
79) Micro bus	151,200	1	151,200	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
80) Mike and Speaker	691	2	1,382	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
81) Air conditioner	2,822	50	141,120	O	0	0		0	0		0	0		0	0		0	0		0	0		0	0		0	0	
82) TV conference sound device	1,438	1	1,438	O	1	1,438	O	1	1,438	O	0	0		0	0		0	0		0	0		0	0		0	0	
83) TV conference video camera	357	1	357	O	1	357	O	1	357	O	0	0		0	0		0	0		0	0		0	0		0	0	
Total			1,477,007			2,320,710			2,420,007			445,368			245,319			603,463			207,970			275,716			459,900	

ANNEX 2: Inputs to the Project

2-6 Placement records of Sudanese counterparts

1) DWSU & DWST

Name & Position of C/Ps		Field of expertise	Participated training	Period assigned as C/P per position
Drinking Water and Sanitation Unit (DWSU)				
1	**Director General, DWSU / Project Director**			
	Mr. Mohamed H. M. Ammar			2011.11- Present
Drinking Water and Sanitation Unit Training Center (DWST)				
2	**Director, DWST / Project Manager**			
	Mm. Eatidal El Rayah Malik	- Training course management - Water supply plan		2011.11- Present
3	**Department of Training Management**			
	Mr. Kamal Hassan Ahmed	- Training course management - Project budget	-	2011.11- Present
4	**Department of Training Management**			
	Ms. Hanan M. Mahmoud	- Training course management - Water supply plan		2011.11- Present
5	**Department of Training Management**			
	Mr. Safe Aldowla Ali	- Training course management - Water supply plan		2011.11- Present
6	**Training Course Coordinator, Department of Training Management**			
	Mr. Egbal B. Alamir	- Well management - Sanitation Management	The 2nd Training in Morocco (2013.04.06 – 04.14)	2011.11- Present
7	**Assistant Training Coordinator, Department of Training Management**			
	Mr. Muataz Hassan. A	- Well management - Pipe network management - Water treatment plant - Electric and Mechanic Management - Equipment management - Community development		2011.11- Present
8	**Assistant Training Coordinator, Department of Training Management**			
	Mr. Sharaf Aldeen Mahmoud	- Well management - Pipe network management - Water treatment plant - Organizational management - Water tariff management		2011.11- Present
9	**Training Course Coordinator, Department of Training Management**			
	Mr. Bashary Ibrahim	- Pipe network management - Water treatment plant - Electric and Mechanic Management - Equipment management		2011.11- Present
10	**Training Course Coordinator, Department of Training Management/Monitoring & Evaluation Department/ Information Center, DWSU**			
	Mr. Omer Elsunni	- Data management - Monitoring		2011.11- Present
11	**Assistant Training Coordinator, Department of Training Management/Monitoring & Evaluation Department/ Information Center, DWSU**			
	Mr. Mohamed Yahia	- Data management - Monitoring		2011.11- Present
12	**Training Course Coordinator, Department of Training Management**			
	Mr. Abdela Majed	- Water quality analysis management		2011.11- Present
13	**Assistant coordinator, Department of Training Management**			
	Ms. Safia Ali Babiker	- Water quality analysis management		2011.11- Present
14	**Assistant Training Coordinator, Department of Training Management**			
	Ms. Tawasul Mohamedd Ali	- Water quality analysis management	The 3rd Training in Morocco (2014.04.05 – 04.13)	2011.11- Present
15	**Department of Training Management**			
	Ms. Wafa Muzzammil	- Sanitation management		2011.11- Present
16	**Sanitation coordinator, Department of Training Management**			
	Mr. Motwkel Mahmoud	- Sanitation management		2014.06 - Present

2) Pilot State Water Corporations

	Name & Position of C/Ps	Field of expertise	Participated training	Period assigned as C/P (2011.11-)
White Nile SWC				
1.	**Director General, White Nile SWC**			
	Mr. Alsadig.M.Tahameed	-		2011.11 - Present
2	**Acting Director of White Nile SWC**			
	Mr. Rahama Elemam Hammad			2011.11- Present
3	**Director, Training Center**			
	Mr.Ahmed Eltayeb	Data Management & Monitoring Sanitation Management	The 2nd Training in Morocco (2013.04.06 – 04.14)	2011.11 – Present
4	**Supervisor of Training Course Management**			
	Mr.Mohammed Alsadig	- Electric Management - Mechanic Management		2011.11- Present
5	**Training Course Coordinator, Department of Training Course Management**			
	Ms. Elresala Mohammed	- Well Management		2011.11- Present
6	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Ali Abdallah	- Well Management		2011.11- Present
7	**Training Course Coordinator, Department of Training Course Management**			
	Mr. El Tayeb Kabashi Abdallah Ibrahim	- Pipe Network Management	The 3rd Training in Morocco (2014.04.05 – 04.13)	2011.11- Present
8	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. El Smani Elfadel	- Pipe Network Management		2011.11- Present
9	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Ahmed Suliman	- Management of Water Treatment Plant		2011.11- Present
10	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Adil Eisa Musa	- Management of Water Treatment Plant		2011.11- Present
11	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Mohammed Yahia M.	- Organization Management		2011.11- Present
12	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Idrees M. idrees.	- Organization Management		2011.11- Present
13	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Abdelwahab Abu Sin	- Water Tariff Management		2011.11 - Present
14	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Ms. Intesar .M.Zain	- Water Tariff Management		2011.11 - Present
15	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Faisad M. Aboushoal	- Electric Management		2011.11 - Present
16	**Training Course Coordinator, Department of Training Course Management**			
	Mr. El Tayebe Ahmed Adam	- Mechanic Management		- Present
17	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Altijany	- Mechanic Management		- Present
18	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Shamseldeen S.M	- Equipment Management		2011.11 - Present
19	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Mohammed A. Suliman	- Equipment Management		2011.11 - Present
20	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mm. Rania Babeke Hassan Ali	- Data Management & Monitoring		2011.11 - Present
21	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Mohammed Bilal	- Water Quality Management		2011.11 - Present
22	**Department of Training Course Management**			
	Mr. Atif	- Water Quality Management		- Present
23	**Department of Training Course Management**			
	Ms. Afaf A. Majed	- Community Development		2011.11 - Present
24	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Awad A. Mahmoud	- Community Development		2011.11 - Present
25	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Elkhlifa Abd Elgbar	- Sanitation Management		2015.01 - Present
26	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Khalefa	- Sanitation Management		- Present
27	**Training Course Coordinator, Department of Training Course Management**			
	Ms. Afra Abbas Musa	- Monitoring		- Present
28	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Ms. Manahil Mahjou	- Monitoring		2011.11 - Present

	Name & Position of C/Ps	Field of expertise	Participated training	Period assigned as C/P (2011.11-)
SENNAR State Water Corporation				
1	**Director General, Sennar SWC**			
	Mr. EL Medani Elkhadir	-		2011.11- Present
2	**Deputy Director General/ Project administration manager, Sennar SWC/ Training course coordinator, Department of Training Course Management** (2013.01 - 2014.05 as Director of training center)			
	Mr. Elsary Kamaleddin	- Water Tariff Management		2011.11-- Present
3	**Director, Sennar SWC Training Center/ Monitoring, follow-up and evaluation unit** (2011.11-2014.05-as Assistant Director)			
	Mr. Abbas Hamid	- Well management	The 1st Training in Morocco (2012.03.18 –03.29)	2011.11 - Present
4	**Assistant director & Training course supervisor, Sennar SWC Training Center/ Training course coordinator, Department of Training Course Management** (2011.11-2013.01 as Director of training center)			
	Mr. Jalal Bashir	- Community Development - Water tariff management	The 2nd Training in Morocco (2013.04.06 –04.14)	2011.11- Present
5	**Training coordinator & instructor, Department of Training Course Management, Sennar SWC Training Center/ Director, Planning and Information Department/ Monitoring, follow-up and evaluation unit**			
	Mr. Ali Hassan Saad	- Well management/ Organization Management/ Sanitation Management		2011.11- Present
6	**Training Course Coordinator, Department of Training Course Management/ Central Sector**			
	Ms. Marwa Osman Abd El Hafizz	- Pipe Network Management		2011.11- Present
7	**Assistant Training Coordinator, Department of Training Course Management/ Planning & development management**			
	Ms. Sara Ali Mohamed	- Pipe Network Management - Monitoring Management		2011.11- Present
8	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Abdel Bagi	- Management of Water Treatment Plant		2011.11- Present
9	**Assistant Training Course Coordinator, Department of Training Course Management/ Supervisor, Project administration**			
	Ms. Sana Osman	- Management of Water Treatment Plant - Monitoring Management		2011.11- Present
10	**Assistant Training Coordinator, Department of Training Course Management**			
	Ms Omima Mohammed Elhaj	- Organization Management - Equipment Management - Well management		2011.11- Present
11	**Training Course Coordinator, Department of Training Course Management/ Director, Central Sennar Sector/ Manager, SWC training center workshop/ Monitoring, follow-up and evaluation unit**			
	Mr. Zakaria Siddeg	- Mechanic Management - Equipment Management		2011.11 - Present
12	**Assistant Training Course Coordinator, Department of Training Course Management**			
	Mr. Mutwakil Mohammed Abdalla	- Mechanic Management		2011.11 - Present
13	**Training Course Coordinator, Department of Training Course Management**			
	Mr. Ayman Ali	- Electric Management		2011.11 - Present
14	**Assistant Training Coordinator, Department of Training Course Management/ Monitoring, follow-up and evaluation unit**			
	Ms. Eman Alnoor Fadl-Almoula	- Electric Management		2011.11 - Present
15	**Director, Singa Sector/Training Coordinator, Department of Training Course Management/ Monitoring, follow-up and evaluation unit**			
	Mr. Ammar Hassan Rahamtalla Mohammed	- Data Management & Monitoring	The 3rd Training in Morocco (2014.04.05 – 2014.04.13)	2011.11- Present
16	**Assistant Training Coordinator, Department of Training Course Management**			
	Ms. Ameera Mohamed Nur	- Data Management & Monitoring		2011.11- Present
17	**Training Course Coordinator, Department of Training Course Management/ Director, Dali Sector**			
	Mr. Ashraf Eltahir Ismail Elnaeim	- Water Quality Management		2011.11- Present
18	**Assistant Training Coordinator, Department of Training Course Management**			
	Mr. Humam Abdeen	- Water Quality Management		2011.11- Present
19	**Training Course Coordinator, Department of Training Course Management**			
	Ms. Rehab Mustafa	- Community Development - Sanitation Management		2011.11- Present
20	**Assistant Training Coordinator, Department of Training Course Management**			
	Mr. Tawil Abd.	- Water Tariff Management		2011.11- 2013.12
21	**Geologist, Sinja Sector/ Monitoring, follow-up and evaluation unit**			
	Mr. Yasir Adam	- Data management, analysis		2014-Present
22	**Manager, Sinja Sector/ Monitoring, follow-up and evaluation unit**			
	Mr. Mohamed Jwoda	-		2014-Present
23	**Director, Groundwater and wadi office/ Monitoring, follow-up and evaluation unit**			
	Mr. Ahmed Widaa	-		2014-Present
24	**Financial Accountant/ Monitoring, follow-up and evaluation unit**			
	Mr. Tarig Osman	- Finance		2014-Present

3) Other State Water Corporations

Organization & Name of C/Ps		Position of C/Ps	Participated training	Period assigned as C/P per position (2011.11-)
Northern State Water Corporation				
1	Mr. Hassan Ali Haj Almahi	Director General		2011 - Present
2	Mr. Abdalla M. Mahmoud	Director, Training Center		2011 - Present
River Nile State Water Corporation				
3	Mr. Abubakr Abdalla Mohammed	Director General		2011 - Present
4	Mr. Waleed Mahgoub Abdelrahman	Director, Training Center	The 2nd Training in Morocco (2013.04.06-04.14)	2011 - Present
Gadaref State Water Corporation				
5	Mr. Mustafa Ibrahim	Director General		2011 - Present
6	Mr. Elbagi Ibraheam Osman	Director, Training Center		2014 - Present
Kassala State Water Corporation				
7	Mr. Hashim M. Abdel Latif	Director General		2011 - Present
8	Mr. Ali Hassan Sadig	Director, Training Center		2011 - Present
Red Sea State Water Corporation				
9	Mr. Naji Izeldin	Director General		2011 - Present
10	Mr. Awwad Abdel Rahim A. Sadig	Director, Training Center		2011 - Present
Al Gazira State Water Corporation				
11	Mr. Fathalrahman M. Abdelrahman	Director General		2014 - Present
12	Ms. Batoul Saad Abdalla Faggad	Director, Training Center	The 2nd Training in Morocco (2013.04.06-04.14)	2011 - Present
Blue Nile State Water Corporation				
13	Mr. Abde Elmman Mohammed Awad	Director General		2014 - Present
14	Mr. Abde Eladeem Mohood			2011 - Present
North Kordofan State Water Corporation				
15	Mr. Anwar Alsadat	Director General		2015 - Present
16	Ms. Afra Mustafa Mohammed	Director, Training Center		2014 - Present
South Kordofan State Water Corporation				
17	Mr. Yassir Kenany	Director General		2013 - Present
West Kordofan State Water Corporation				
18	Mr. Ibrahim Shaib Mohamed	Director General		2011 - Present
19	Mr. Mohammed Adam Idries	Director, Training Center		2011 - Present
North Darfur State Water Corporation				
20	Mr. Nasir Eldeen Mahmoud	Director General		2011.11 - Present
21	Mr. Salma Hassan Abubasher	Director, Training Center		2013 - Present
South Darfur State Water Corporation				
22	Mr. Idris Debaca Adam	Director General		2011 - Present
23	Mr. Hassan Adam Mohammed	Director, Training Center	The 1st Training in Morocco (2012.03.18.03.29)	2011 - Present
West Darfur State Water Corporation				
24	Mr. Mhmoud Abdalla Bashir Jama	Director General		2011 - Present
25	Mr. Mohamed Hassan Mohamed	Director, Training Center		2014 - Present
East Darfur State Water Corporation				
26	Mr. Hassan Adam Mahmoud Basheer	Director General		2014 – Present
Central Darfur State Water Corporation				
27	Mr. Ibrahim Abaker Digies	Director General		2014 - Present
Khartoum State Water Corporation				
28	Mahgoub Elhalawi	Director General		2014 - Present

ANNEX 2: Inputs to the Project

2-7 Local cost from Sudanese side

1) DWST annual budget for training activities

Item	FY2011	FY2012	FY2013	FY2014	FY2015	Total
Personnel expense (trainee daily allowance, lecturer compensation counterpart fee, skilled workshop labors)	312,600	312,600	437,000	545,000	648,500	2,255,700
Transportation expense (Trainees, lecturers, investigation assistance, exchange experience)	63,000	105,600	79,000	220,000	220,000	687,600
Welfare expense (food expenses of the lodgings, equipment costs of the lodgings, entertainment costs)	155,000	239,000	581,500	598,000	598,000	2,171,500
Office work costs (office supplies, office work machine, maintenance costs of the center)	108,000	120,000	380,000	320,000	320,000	1,248,000
Communication costs (Telephone/fax, internet, anti-virus)	12,000	15,200	45,000	25,500	25,500	123,200
Expenses for lighting and fuel (electricity, water, gas)	39,300	39,300	79,200	79,200	79,200	316,200
Training expense (document purchase, machine parts purchase costs, document making, meeting place)	283,000	283,000	553,000	523,000	523,000	2,165,000
Workshop, seminar, meeting costs (tea, snack, JCC meeting allowance)	90,000	90,000	70,000	57,500	57,500	365,000
Field survey (fuel, allowance, lodging, maintenance)	54,000	57,000	78,000	366,000	708,000	1,263,000
Workshop maintenance costs (maintenance, spare parts, building maintenance)	62,000	62,000	124,000	124,000	124,000	496,000
Others (lodging utilities, emergency payment)	30,000	30,000	36,000	48,000	48,000	192,000
TOTAL (SDG)	1,208,900	1,353,700	2,462,700	2,906,200	3,351,700	11,283,200

(Unit: SDG)

2) White Nile SWC annual budget for training activities

Item	FY2012	FY2013	FY2014	FY2015	TOTAL
Salary	69,500	81,700	155,900	198,150	505,250
Transportation	5,310	5,600	96,200	96,200	203,310
Welfare expense	56,000	16,625	60,700	104,220	237,545
Stationary & office consumables	4,935	8,980	12,716	13,499	40,130
Equipment maintenance	20,400	48,600	32,000	32,000	133,000
Communication	6,700	21,576	29,000	36,800	94,076
Electricity, water, fuel	16,914	9,000	13,920	15,360	55,194
Workshop, Seminar, Meeting	3,600	5,860	108,400	112,400	230,260
Field survey	4,800	17,400	28,200	33,000	83,400
Others	12,000	2,400	7,200	9,000	30,600
Total (SDG)	200,159	217,741	544,236	650,629	1,612,765

(Unit: SDG)

3) Sennar SWC annual budget for training activities

Item	FY2012	FY2013	FY2014	FY2015	TOTAL
Salary	40,400	108,480	88,800	112,050	349,730
Transportation	10,290	2,360	26,100	96,750	135,500
Welfare expense	19,350	25,680	128,600	73,700	247,330
Stationary & office consumables	24,000	9,870	8,190	13,499	55,559
Equipment maintenance	104,010	36,000	24,000	32,000	196,010
Communication	14,000	23,000	12,000	10,000	59,000
Electricity, water, fuel	27,300	26,772	10,560	9,720	74,352
Workshop, Seminar, Meeting	90,000	17,100	10,900	54,400	172,400
Field survey	57,000	32,400	31,800	27,000	148,200
Others	290,500	12,000	59,040	30,000	391,540
Total	676,850	293,662	399,990	459,119	1,829,621

(Unit: SDG)

Note: Fiscal year of Sudan starts from January and ends in December.

ANNEX 3: RESULTS OF THE EVALUTION

3-1 Achievement of the Project

<table>
<tr><th>Planned Activities</th><th>Results</th></tr>
<tr><td colspan="2">OUTPUT 1: Training courses are implemented by DWST based on its midterm/long-term human resources development plan.</td></tr>
<tr><td>1-1 DWST elaborates draft plan for mid-term/ long-term human resource development.</td><td>・Based on "Quarter Century Strategy for Water Supply 2011-2031", DWST prepared the outline of the "Mid-term/Long term Human Resources Developments Plan 2012-2026" and JCC discussed and approved it at the second JCC on June 27, 2012. The plan is on condition that a new training center is completed in Kilo Ten area. It is also intended to strengthen computer and English skills to enforce promotion of the high value added human resources development.
・DWST and other relevant Sudanese authorities with JICA experts had several discussion and conducted questionnaire survey. These results were reflected to the plan.
【Mid-term plan (2012-2018)】 Its goal is to develop 5 skills (1. Computer Skill, 2. Data process & analysis, 3. Presentation, 4. Report Making, 5. English), and consists of following activities (1. Construction of New Training Center at Kilo Ten, 2. Set up an effective organization and management system in DWST, 3. Establishment of the Training Unit in each SWC, 4. Establishment of concrete training system in each SWC, 5. Establishment of monitoring system of the training, 6. Establishment of the regular meeting of each Training Center, 7. Set up the information center at DWST, 8. Set up the database of the staff for all SWCs, 9. Set up the management system by computer, 10. Set up an original website in each SWC and DWST, 11. Introduction and installation of new technology (Solar system))
【Long-term (2012-2026)】 Its goal is to develop 7 skills (1. Organizational management skill, 2. Designing skill for research, 3. Project management skill, 4. Facility management skill, 5. Equipment management skill, 6. Quality management skill, 7. Monitoring & evaluation skill) and it consists of 5 activities (1. Technical exchange of Morocco, 2. Set up of DWST satisfying international standard, 3. Core training center in Africa, 4. Good maintained training center, 5. Involving private sector trainees)</td></tr>
<tr><td>1-2 DWST prioritizes actual needs for the training courses.</td><td>・In Year 1, DWST with JICA experts visited 10 states (Northern state, Gezira state, Gadaref state, Kassala state, Blue Nile state, Sennar state, White Nile state, North Kordofan state, North Darfur state, West Darfur state), and conducted needs assessment of training. DWST prioritized actual needs for the training course as below. (Rating: A for high priority, B for moderate priority)
<table>
<tr><th>No.</th><th>Stage</th><th>Soft Wear Training</th><th>Priority</th><th>Hard Wear Training</th><th>Priority</th></tr>
<tr><td>1</td><td>Survey Design</td><td>Design/Cost Estimation</td><td>B</td><td>Geophysical Survey</td><td>A</td></tr>
<tr><td></td><td></td><td>Basic Computer</td><td>A</td><td>Preliminary Study</td><td>B</td></tr>
<tr><td></td><td></td><td>Reporting</td><td>A</td><td>Design of Water Treatment Plant</td><td>B</td></tr>
<tr><td></td><td></td><td>Presentation 1</td><td>A</td><td>Design of Water Yard</td><td>A</td></tr>
<tr><td></td><td></td><td>Data Collection/GIS</td><td>A</td><td>Design of Distribution Pipe Line</td><td>A</td></tr>
<tr><td></td><td></td><td>Project Cycle Management (PCM)</td><td>A</td><td>Basic Mechanics and Electricity</td><td>A</td></tr>
<tr><td>2</td><td>Procurement Construction</td><td>Equipment Procurement</td><td>B</td><td>Construction Management of Well Drilling</td><td>A</td></tr>
<tr><td></td><td></td><td>Inspection of Equipment</td><td>B</td><td>Construction Management of Water Treatment</td><td>B</td></tr>
<tr><td></td><td></td><td>Management of Equipment</td><td>A</td><td>Construction Management of Water Yard</td><td>A</td></tr>
<tr><td></td><td></td><td>Work Plan</td><td>A</td><td>Installation of Pump and Generator</td><td>A</td></tr>
<tr><td></td><td></td><td>Contract</td><td>B</td><td>Construction Management of Pipe Network</td><td>A</td></tr>
<tr><td>3</td><td>Operation Maintenance</td><td>Organizational Management</td><td>A</td><td>Well Management</td><td>A</td></tr>
<tr><td></td><td></td><td>Collection of Water Tariff</td><td>A</td><td>O&M of Water Treatment Plant</td><td>A</td></tr>
<tr><td></td><td></td><td>Community Development</td><td>A</td><td>O&M of Water Supply Facility</td><td>A</td></tr>
<tr><td></td><td></td><td>Data Base/GIS</td><td>A</td><td>Water Quality Management</td><td>A</td></tr>
<tr><td></td><td></td><td>O&M Manual</td><td>A</td><td>Pipe Network Management</td><td>A</td></tr>
<tr><td></td><td></td><td>Water Strategy</td><td>A</td><td>Workshop Management</td><td>A</td></tr>
<tr><td>4</td><td>Monitoring</td><td>Methodology of Monitoring</td><td>A</td><td>Monitoring of Facility</td><td>A</td></tr>
<tr><td></td><td></td><td>Monitoring Report</td><td>B</td><td>Monitoring of Equipment</td><td>A</td></tr>
<tr><td></td><td></td><td>Presentation 2</td><td>B</td><td>Monitoring of Management</td><td>A</td></tr>
<tr><td>5</td><td>Rehabilitation Modification Expansion</td><td>Rehabilitation Plan</td><td>A</td><td>Well Rehabilitation</td><td>A</td></tr>
<tr><td></td><td></td><td>Design/Cost Estimation of Rehabilitation</td><td>A</td><td>Rehabilitation & Expansion of Water Yard</td><td>A</td></tr>
<tr><td></td><td></td><td>Equipment Procurement of Rehabilitation</td><td>A</td><td>Rehabilitation & Expansion of Water Treatment Plant</td><td>A</td></tr>
<tr><td>6</td><td>Others</td><td>Basic English</td><td>A</td><td>Water Harvesting</td><td>B</td></tr>
<tr><td></td><td></td><td>Management of Project Fund</td><td>B</td><td>Desalinization of Sea Water</td><td>B</td></tr>
</table></td></tr>
</table>

1-3 DWST elaborates its training implementation plan based on the draft plan for midterm/ long term human resource development.

- Based on the framework of the "Mid-term/ long term human resource development 2012-2016", DWST improved its training design and plan annually.
- Prior to Phase 2 started in November 2011, DWST had implemented training in 13 different courses as below.

> 1. O&M of water treatment plant, 2. Water supply facility, 3. Data management/GIS, 4. Well management, 5. Organizational management, 6. Water analysis, 7. Pipe network management, 8. Water facility management, 9. Isotope in hydrology, 10. Procurement & storage, 11. Software of pipe network, 12. Hydrometric & surface water, 13. Groundwater geophysics & water well design

- Starting from Year 1 of Phase 2, DWST has been developing following courses:

> 1. Project Cycle Management, 2. Advance well management, 3. Borehole camera, 4. Basic 2D Geo-electrical imaging, 5. Presentation skill, 6. Training of Trainer, 7. Report writing, 8. Planning Monitoring & Evaluation, 9. Well rehabilitation, 10. Engineering economy, 11. Data management/GIS & remote sensing, 12. Solar system, 13. Basic of programmable logic controllers, 14. Supply chain, 15. Estimation costs & equipment management, 16. Computer skills (Excel), 17. Sanitation management, 18. Management skills & Projects planning, 19. Workshop for integrated water resources management & its role for peace-building & conflict resolution, 20. Statistical package for social science (SPSS), 21. Improve rural water supply management, 22. Water analysis (Instrument) (Chromatography techniques) (Chromatography-HPLC) (ISO 17025) (Instrument & Groundwater Treatment), 23. Advanced Procurement & Storage, Management Skills (primavera), 24. Tendering contracts, 25. Human resources development,

- Since PWC changed to DWSU in August 2012, it also required DWST to cover sanitation management. From January 2014, a new course of sanitation management is designed and added to the training plan. Accordingly training coordinators assigned for the course. After conducting 1 session of the sanitation management course, DWST training coordinators managed to implement the 2nd session by themselves.

1-4 DWST implements training courses based on the training course implementation plan.

- As of December 2014, total number of training participants in DWST is 1,775 (through 113 sessions of 35 training courses from phase 1 to phase 2 of the Project).
- For 2015, DWST has been planning and implementing 25 sessions of 16 training courses.
- Participants of the training in DWST are from 30 different organizations. Over 80% of total trainees in DWST are from SWCs. In addition, UNOPS, IOM and AfDB dispatched trainees including SWC staff members from Darfur states and South Kordofan state to DWST from September, 2013 as parts of their programs.

No	DWST Training Course	Number of trainees (person) by year							
		2009	2010	2011	2012	2013	2014	2015	Total
1	Water Treatment Plant	41	17	15	29(14+15)	0	29(11+10+8)		131
2	Water Supply Facility	64(22+20+22)	18	31(16+15)	29(14+15)	52(17+19+16)	16	16	226
3	Data Management /GIS	46(16+15+15)	27(14+13)	16	26(13+13)	31(17+14)	0	13	159
5	Well Management	19	37(19+18)	17	16	0	44(18+14+12)		133
6	Organizational Management	12	25(12+13)	0	0	13	16		66
4	Water Quality	0	33(17+16)	32(16+16)	29(14+15)	29(15+24)	26(15+11)	14	163
7	Pipe Network Management	0	35(18+17)	30(11+19)	26(13+13)	54(13+13+16+12)	48(17+16+15)		193
8	Water Facility Management*	0	39(15+9+11+4)	0	0	0	0		39
9	Advanced Well Management*	0	0	0	9	0	0		9
10	Borehole camera*	0	0	0	8	0	0		8
11	Estimation Cost & Equipment Management*	0	0	0	0	9	0		9
12	Isotope Hydrology	0	0	8	0	0	0		8
13	Procurement and Storage /Supply chain			13	19	10	10		52
14	Water Well Design			16	16	49(13+11+9+16)			81
15	Hydrometric and Surface Water			25	0	0			25
16	Management of Project Cycle			16	15	0			31
17	Geo Electrical Imaging*				26(12+14)*	0			26
18	Presentation Skill				15	0			15
19	Training of Trainer				13	0			13
20	Report Writing				11	11			22
21	Planning Monitoring and Evaluation					18			18
22	Economic Impact of Well Rehabilitation					12			12
23	Engineering Economy					14			14
24	Solar System					24(9+15)			24
25	Groundwater Treatment & Chromatography Techniques					25(15+10)	27(13+14)		52

26	Basic of PLC					17			17
27	Computer Basic Excel					12			12
28	Sanitation Management						34(19+15)		34
29	Management Skills & Projects Planning						26(14+12)		26
30	Integrated Management of Water & its Role in Peace-Building and Conflict Resolution						25		25
31	Statistical Package for Social Science (SPSS)						11		11
32	Technical Management of Water Yards	0	0	0	0	0	18		18
33	Workshop on Atlas of Ground & Surface water							73	73
34	Rural water supply development							14	14
35	Pensions & Insurances							16	
	Total	182	231	219	287	380	330	146	1,775

*Specially designed course for Darfur states & Three Protocol Areas

・In March 2012, DWST Director with JICA expert visited Morocco for preparation of the training course with the several institutions. Training in Morocco started in May 2012. Total of 38 trainees have been dispatched to the group training in Morocco through 2012 to 2014 as shown in the table below. They visited several water supply facilities and gained technical knowledge. When they came back to Sudan, every group presented their reporting of training outcomes.
Through analyzing the water supply issues in Sudan by comparing with situation in Morocco, trainees were able to change their perception and promote their self-effort.
・One of the ex-participants from Sennar SWC prepared human resources development plan for the water supply sector. During the Project period, the 4th training in Morocco is planned for 14 trainees in March-April 2015.

	Period	Theme	Participants	Reporting
0	2012.03.18-03.29	・Visiting and learning about water resources management and drinking water supply in urban area and rural areas, water-saving irrigation, sewage treatment, waste water recycle plan ・Discussion with organizations receiving Sudanese trainees (National Drinking Water and Electricity Corporation in Morocco (ONEE), National Water Corporation (ONEP), Department Water, Hydraulic Basin Office of Tenshift (ABHT), Hydraulic Basin Office of Sus Massa Darra (ABHSMD)	・DWST (1), JICA Expert (1)	2012.3.29
1	2012.05.13-05.27 (14 days)	・Visiting and learning from advanced training facilities, training implementation framework, water resources development & protection, urban water supply system, rural water supply system, sewage treatment & wastewater recycle, water-saving irrigation, and discussion with relevant personnel of the Moroccan side. ・Study about how Morocco could achieve the most advanced water resources development and human resources development as well as water supply in Africa.	16 persons (Target group: Engineers of SWCs) <Trainees> DWST (1), Sennar state (2), White Nile state (2), Kassala state (3)**, Darfur areas (3)*, South Kordofan state (1)*, Blue Nile state (1)* <Organizers> Coordinator (1), JICA Experts (2)]	2012.6.20
2	2013.04.06-04.14 (9 days)	・Lecture and site visits in ONEP, Department of Water, ABHT, ABHSMD, Department of Equipment ・Fez water treatment plant and water supply facilities ・Overall training management	17 persons (Target group: SWCT director, Engineers) <Trainees> DWST (1), Northern state (1), River Nile state (1), Khartoum state (1), Gezira state (1), Sennar state (1), White Nile state (1), North Kordofan state (1)*, North Darfur state (1)*, West Darfur state (1)*, South Darfur state (1)*, South Kordofan state (1)* <Organizers> JICA Experts (2), JICA Sudan Office (1)	2013.4.29
3	2014.04.05-04.13 (9 days)	・Rural water supply, fee collection method, set-up of water meters, Operation and management of facilities and equipment etc. ・Sewage treatment & waste water recycle, water-saving irrigation	12 persons <Trainees> DWST (1), Sennar state (1), White Nile state (1), Kassala state (2), Red Sea state (1), River Nile state (1), Northern state (1), Gedaref state (1) <Organizers> Coordinator (1), JICA Experts (1)	2015.5.14
4	Planned for 2015.03-04 (9 days)	・Operation and management methods of facilities and equipment of water treatment plant of ONEE ・Discussion on future approaches for human resources development in Sudan and Morocco	13 persons <Trainees> DWST(1), Sennar state (1), White Nile (3) , Kassala state (1), Northern state (1), River Nile state (1), Khartoum state (1), Gadaref state (1), Gezira state (1) <Organizers> Coordinator (1), JICA Expert (1)	-

* Participants from "Project for Human Resources Development for Darfur and the Three Protocol Areas"

<table>
<tr><td></td><td>** Participants from "Capacity Development Project for the Provision of Services for Basic Human Needs in Kassala"

・In order to start sustainable South-South cooperation between Morocco and Sudan, DWSU has invited experts from Morocco since 2012. Details of these activities can be found in the training reports prepared by the experts from Morocco. During the planned 4th training in Morocco, representatives from the Sudanese side and the Moroccan side are planning to discuss future approaches for human resources development in Sudan and Morocco including the vision of human resources development of Sudan.
<table>
<tr><th></th><th>Period</th><th>Theme</th><th>Participants</th></tr>
<tr><td>1</td><td>2012.12.08
-12.16
(9 days)</td><td>・Advisory to DWST on training implementation structure and training contents, Site visits of DWST, Advisory to SWCs on training courses etc.
・Site visited: Ministry of Water Resources and Electricity, DWSU, DWST, PSWC, Kassala SWC, Gezira SWC</td><td>5 persons from ONEE</td></tr>
<tr><td>2</td><td>2013.12.13
-12.27
(9 days)</td><td>・Meeting with DWSU and DWST
・Site visits in Jubel Alaouia Dam, Sennar Dam, Gezira state water quality research center, water treatment plant, Kilo ten training center, Soba water treatment plant.
・Presentation to DWSU, DWST, SWCs (Variation of water utilization, Water resources development in Morocco)
・"International Desalination Seminar", Site survey in the facilities for desalination in Red Sea state</td><td>4 persons from ONEE (3), Ministry of Water (1), ABHSMD (1)</td></tr>
<tr><td>3</td><td>2014.12.13
-12.18
(6 days)</td><td>・Discussion on future approaches for human resources development in Sudan and Morocco</td><td>2 persons from International Institute of Water and Sanitation affiliated to ONEE, the National Company for Electricity and Potable Water in Morocco (1), Hydrolic Basin Agency of Bouregreg and Chaouia (ABHBC), Ministry of Water, Mining, Energy and Environment (1)</td></tr>
</table></td></tr>
<tr><td>1-5 DWST evaluates the training courses.</td><td>・DWST has conducted evaluation of the training courses utilizing methodology developed in Phase 1 of the Project and compiled to the training reports. Each session of the training course is graded (5 grades) by trainees on 3 categories (1. Contents, 2. Lecturers, 3. Facilities).
・DWST has conducted final exams for each training course to assess trainees' understanding and techniques. For every course, DWST has been awarding the prize for the best trainees whose exam results are the highest among participants.
・Majority of participants of the training in Morocco in 2012 responded 'highly satisfied with the training'. All of the participants of the training in Morocco in 2013 & 2014 responded 'highly satisfied'.</td></tr>
<tr><td>1-6 DWST revises training course contents, textbooks and manuals based on the evaluation results of the training courses.</td><td>・DWST training coordinators with technical advice by JICA Experts made revisions of curriculums developed in Phase 1 and prepared new training materials for new courses. DWST have been managing the database for these training materials.
・There are still issues to be solved for upgrading training curriculum, textbooks and manuals once the new training center is opened in near future.
・In addition, DWST developed several manuals. (Annex 4: List of materials developed by the Project)</td></tr>
<tr><td>1-7 DWST improves its capacity responding to the expansion of training center.</td><td>・In January 2011, Iranian loan agreement was made for construction of the new training center. Due to delay in its construction because of funding and contracting issues, new training implementation structure of DWST has not been established. However, with leadership of the core staff members from Phase 1, DWST has been planning and managing the training courses in the existing training facility with available equipment.
・DWST has increased the number of trainees every year. (219 participants for 2011, 287 participants in 2012, 380 participants in 2013, 330 participants in 2014)
・DWST has increased its budget every year. (1,208,900SDG in 2011, 1,353,700SDG in 2012, 2,462,700SDG in 2013, 2,906,200SDG in 2014)</td></tr>
<tr><td>1-8 DWST finalizes the mid-term/ long-term human resources development plan, which is to be authorized by the Government of</td><td>・DWST has discussed with MoHRD about draft "Mid-term/long-term human resources development 2012-2026" developed through Activity 1-1.
・In February 2015, DWST submitted the final draft of the plan to the Federal Ministry of Water Resources and Electricity (MoWRE).
・Once the MoWRE approves it, DWST will submit the final version to the Federal Ministry of Human Resources Development (MoHRD) for approval and issuing the certificate of authorization by August 2015.</td></tr>
</table>

Sudan.

OUTPUT 2: Training course implementation structures in PSWCs are developed by PSWCs in collaboration with DWST.

2-1 DWST strengthens its leadership through the support of below activities of SWC.

- DWST director and course coordinators assisted SWC training coordinators through regular visits and daily correspondence. In pilot states where JICA Experts stay, DWST coordinator provided advisory and daily supports on training plan design, implementation methods, various evaluation, and training center management.
- Director General meetings are held regularly. Information and opinions are shared among SWCs and DWST.

2-2 PSWCs establish training units within the organization.

- In November 2011, White Nile SWC established its training center. In April 2012, Sennar SWC established its training center.
- By Year 3, PSWCs allocated staff members for their training centers. Most of these staff members have their own duties besides implementation of training.

2-3 PSWCs develop the draft SWC activities plan.

- In Year 4, each PWC has been developing the "Action Plan" which consists of training implementation plan for the coming 3 years (2015-2017).
- Every year, PSWCs have secure annual training budget. (ANNEX 2: Inputs to the Project, 2-6 Local cost from Sudanese side)

2-4 PSWCs prioritize actual needs for the training courses

- In Year 1 of the Project, priorities of training were identified for the pilot states as below. (Rating: A for high priority, B for moderate priority)

No.	Stage	Soft Wear Training	Priority	Hard Wear Training	Priority
1	Survey Design	Basic Computer	A	Geophysical Survey	A
		Reporting	A	Basic Mechanics and Electricity	A
		Presentation	A		
		Data Collection/GIS	A		
2	Procurement Construction	Equipment Procurement	A	Installation of Pump and Generator	A
		Inspection of Equipment	A	Construction Management of Pipe Network	A
		Management of Equipment	A		
3	Operation Maintenance	Organizational Management	A	Well Management	A
		Collection of Water Tariff	A	O&M of Water Treatment Plant	A
		Community Development	A	O&M of Water Supply Facility	A
		Data Base/GIS	A	Water Quality Management	A
		O&M Manual	A	Pipe Network Management	A
		Water Strategy	A	Workshop Management	A
4	Monitoring	Methodology of Monitoring	A	Monitoring of Facility	A
				Monitoring of Equipment	A
				Monitoring of Management	A
5	Rehabilitation Modification Expansion			Well Rehabilitation	A
				Rehabilitation & Expansion of Water Yard	A
6	Others	Management of Project Fund	A		

2-5 PSWCs develop training course implementation plan based on the priority

- In Year 1, JICA Experts designed training plan for pilot states and conducted 2 courses (1. Well management, 2. Organizational management).
- In Year 2, in addition to the Computer training course that Sudanese side can implement on their own, 10 other courses were planned with technical assistance by JICA Experts (1. Organizational management, 2. Well management, 3. Water quality management, 4. Data management, 5. Equipment management, 6. Mechanical management, 7. Electricity management, 8. Pipe network management, 9. Water treatment facility management, 10. Community development). Training period varied from 3 days to 19 days depends on training contents for each course.
- In Year 3, PSWC added new course for collection of water tariff.
- In Year 4, PSWCs developed new course for sanitation management. In addition, Kosti Special Training (Equipment management, Mechanical management, Electricity management) is planned and implemented for the purpose of supporting C/Ps of the grant project "The Project for improvement of water treatment plant in Kosti city."

2-6 PSWCs'

- In Year 1, PSWC utilized training materials that DWST developed in Phase 1 and manage in the training database. Curriculum and textbooks in the databased were translated to Arabic and

training units develop training course curriculum (including OJT in Localities) and textbooks.	prepared for the training courses in PSWCs. ・Since Year 2 , PSWC training management staff members with technical assistance by JICA Experts, have conducted a series of discussion with lecturers such as from universities, and developed curriculum and textbooks. DWST dispatched its staff members to PSWCs to transfer their knowledge on how to manage training courses. ・Training courses such as well management, mechanical management, electrical management, equipment management, community development and sanitation management apply OJT methods on sites besides lecture at the training center. For those courses lectured in the training center (e.g. database management) also use topics and materials that trainees deal with at their work.
2-7 PSWCs' training units implement training courses.	・PSWC training coordinators implemented planned training and achieved contribution rates on training management as in table below. Total number of participants of the training conducted in both PSWCs exceeds 941 (as of 5 March 2015). ・Total participants in White Nile SWC is 523 (as of 5 March 2015). Contribution rates of the training coordinators (annual average) in White Nile SWC have reached over 80% in 2013 and increased annually (by 36% from 2012 to 2013 and by 9% from 2013 to 2014). In 2014, Kosti special training (electricity, mechanical, and equipment management) was conducted for C/Ps in White Nile state where grant program is planned by Government of Japan is planned for water supply facilities (Number of the trainees: 25).

Course	White Nile SWCT								
	2012		2013		2014		2015		Total
	Trainee (person)	Contribution (%)	Trainee (person)	Contributio n (%)	Trainee (person)	Contribution (%)	Trainee (person)	Contribution (%)	Trainee (person)
Organizational management	20 (10+10)	62.1, 63.6	19	87.9	-	-	28	86.7	39
Well management	11	60.0	14	63.0	12	86.7	12	-	37
Water quality management	10	66.0	-	-	47 (21+26)	84.0, 94.0	-	-	57
Data management	10	61.7	14	87.2	-	-	-	-	24
Equipment management	13	65.0	14	86.1	-	-	-	-	27
Mechanical management	11	67.0	-	-	50 (11+14+25)	81.0, 95.7, 86.1	-	-	61
Electrical management	7	73.2	-	-	13	90.6	6	-	26
Pipe network	-	-	17 (9+8)	86.0, 67.0	14	94.0	-	-	31
Water treatment plant management	-	-	13	82.6	50 (24+26)	86.3, 94.3	-	-	63
Community development	-	-	17	82.6	17	85.0	12	94.6	46
Water tariff management	-	-	25	84.0	-	-	28	86.7	25
Sanitation management	-	-	-	-	19	91.0	-	-	19
Total number of participants/ Average contribution rates	82	64.8	133	80.7	222	89.1	86	89.3	523

Source: White Nile SWC Database

・Total participants in Sennar SWC is 418 (as of 5 March 2015). Contribution rates of the training coordinators (annual average) in Sennar SWC have reached 88.2% (by 21% from 2012 to 2013, by 8% from 2013 to 2014). Moreover, Sennar SWC conducted training courses by themselves (indicated as 100% contribution) for 11 times. For 2013, annual average contribution rate exceeds the target rate of 80%.

・In Sennar, with technical support by JICA expert, SWC training coordinators developed and implemented well management training for 8 engineers from Darfur in addition to 8 engineers from Sennar PWC (2013.3.10-14). In this course, participants have learnt about Hawata Project supported by Germany including operations of water yard, management of spare parts, stand-by power system, independent water tariff management system etc.

Course	Sennar SWCT								
	2012		2013		2014		2015		Total
	Trainee (person)	Contribution (%)	Trainee (person)	Contribution (%)	Trainee (person)	Contribution (%)	Trainee (person)	Contribution (%)	Trainee (person)
Organizational management	32 (10+15+7)	59.0, 100, 53.0	24 (14+10)	N/A, 76.9	-	-	-	-	56
Well management	11	65.0	20 (11+9)	64.1, 91.1	-	-	8	95.90	39
Water quality management	5	67.0	-	-	19 (10+9)	82.0, 94.3	-	-	24
Data management	10	71.8	9	87.8	-	-	-	-	19

Equipment management	10	61.0	7	81.4	7	81.4			24
Mechanical management	-	-	11	78.0	18 (9+9)	87.5, 87.5			29
Electrical management	-	-	16 (7+9)	86.0, 100	7	92.4	-		23
Pipe network	-	-	17 (9+8)	67.0, 83.5	5	94.0			22
Water treatment plant management	-	-	12	81.1	19 (9+10)	87.1, 92.3			31
Community development	-	-	15	78.7	12	86.3	11	94.7	38
Water tariff management	-	-	12	87.0	-	-	-	-	12
Sanitation management	-	-	-	-	9	92.0			9
Basic Computer	24 (13+11)	100, 100	-	-	-	-			24
Auto CAD	-	-	10	100.0	-	-			10
Excel Accounted	-	-	10	-	-	-			10
Government fund system	-	-	11	100.0	-	-			11
Government Accounting Process	-	-	-	-	11	100			11
Public service act	-	-	-	-	12	100			12
Global position system	-	-	-		14	100			14
Total number of participants/ Average contribution rates	92	69.31	174	84.1	133	91.2	19	95.3	418

Source: "Sennar State Water Corporation training monitoring, 4 February 2015" & data provided by JICA Experts.
Note: Number of monitoring workshop are excluded and mentioned in Output 3 below.

2-8 PSWCs' training unit evaluate the training courses.

・In White Nile state, trainees evaluated training courses as below.

Course	White Nile SWCT											
	2012			2013			2014			2015		
	course	lecturer	facility	course	lecturer	facility	course	lecturer	facility	course	lecturer	facility
Organizational management	87.0 89.7	98.0 92.6	89.7 89.7	97.4	94.1	92.9	-	-	-	98.6	97.2	86.7
Well management	65.4	66.0	76.2	76.4	52.0	60.1	92.9	89.8	85.0	N/A	N/A-	55.0
Water quality management	80.6	82.2	82.9	-	-	-	91.3	84.1	86.2	-	-	-
Data management	96.2	95.9	92.9	99.1	88.2	93.6	-	-	-	-	-	-
Equipment management	98.8	98.2	95.5	92.5	95.1	89.2	99.1	98.85	98.3	-	-	-
Mechanical management	93.8	92.0	88.7	-	-	-	93.2 93.2	92.6 96.3	90.9 92.4	-	-	-
Electrical management	89.1	91.7	92.2	-	-	-	89.2	91.7	91.8	N/A	N/A	N/A
Pipe network	-	-	-	91.1 90.1	88.3 87.2	89.0 89.8	90.4	90.3	89.7	-	-	-
Water treatment plant management	-	-	-	93.9	92.4	90.6	93.8 93.5	89.6 93.77	88.7 94.1	-	-	-
Community development	-	-	-	94.5	96.3	96.0	94.1	95.3	94.1	76.0	95.1	84.2
Water tariff management	-	-	-	93.9	92.4	90.6	-	-	-	98.6	97.2	86.7
Sanitation management	-	-	-	-	-	-	85.5	89.9	87.7	-	-	-
Average (%)	87.6	89.6	88.5	92.1	87.3	88.0	92.4	92.0	90.8	94.4	96.5	78.15

Source: White Nile SWC training center

・In Sennar state, trainees evaluated training courses as below.

Course	Sennar SWCT											
	2012			2013			2014			2015		
	course	lecturer	facility	course	lecturer	facility	course	lecturer	facility	course	lecturer	facility
Organizational management	97.0	95.5	80.1	98.3	96.7	92.9				-	-	-

	98.4	98.0	93.0									
Well management	92.1	92.5	-	82.6 96.8	86.4 94.7	93.3 94.6				99.1	98.5	98.5
Water quality management	94.8	89.8	91.8				95.0 93.9	95.7 95.2	83.5 92.6	-	-	-
Data management	94.8	93.9	88.8	95.5	98.0	90.8				-	-	-
Equipment management	96.4	95.8	80.0	96.7	97.0	93.0	99.1	98.8	98.3			
Mechanical management	-	-	-	96.3	93.4	84.0	98.1 98.1	97.4 97.7	87.0 87.0	-	-	-
Electrical management	-	-	-	82.2	92.2	76.5	98.8	98.8	82.4	-	-	-
Pipe network	-	-	-	91.1 95.8	88.3 94.3	89.0 89.0	100	97.88	89.0			
Water treatment plant management	-	-	-	94.7	93.7	92.6	95.0 93.2	93.8 87.9	91.0 78.7			
Community development	-	-	-	96.6	94.5	92.8	96.2	96.7	91.0	98.2	98.5	88.9
Water tariff management	-	-	-	97.1	98.2	93.0				-	-	-
Sanitation management							97.6	96.6	96.7			
Basic Computer												
Auto CAD				97.7	97.1	95.4						
Excel Accounted												
Government fund system												
Government Accounting Process							97.2	97.2	92.5			
Public service act							98.3	96.0	94.5			
Global position system							93.6	90.4	92.4			
Average (%)	95.6	94.25	86.74	94.0	94.2	90.5	96.7	95.7	89.8	98.7	98.5	93.7

Source: "Sennar State Water Corporation training monitoring, 4 February 2015" & data provided by JICA Experts.

2-9 PSWCs' training units revise training course curriculum and textbooks based on the evaluation results of the training courses	・PSWC training coordinators have revised curriculum, textbooks based on results of evaluation and technical advice by JICA Experts. ・In Year 2, participated trainees commented that training period was short. There have been limitations of training facilities given the current condition with 1 seminar room and 1 computer room. However, in response to the evaluation results by the trainees, PWSCs have extended training period to 2 weeks or more depending on training courses by scheduling courses which do not require the seminar room all the time.
2-10 PSWCs reflect the monitoring result of draft SWC activities plan to training course implementation plan.	・Since the "Water, Sanitation and Hygiene (WASH) Sector Strategic Plan 2011-2016" was developed before PSWCs started planning for establishment of training centers, the target of capacity development of human resources through training in technical and managerial aspects are set lower than actual achievement level indicated in Activity 2-7 above.(e.g. In White Nile WASH sector strategy, number of staff to be trained in WASH related technical and managerial subjects is set for 120 SWC and MoH staff and number of staff trained in technical issues is set for 150. In Sennar WASH sector strategy, ・Each PWC has been developing the "Action Plan" which consists of training implementation plan (1. Concept of human resources development, 2. Issues of water supply, Needs of human resources, Training target, 3. Achievement of human resources development (The number of courses & trainees, Comparison with State WASH strategy 2011-2016), 4. Training implementation structure, 5. Three year training plan (2014-2018) (The number of courses & participants, Target number of trainees, Budget).
OUTPUT 3: Monitoring system is established within DWSU and pilot SWCs for training course implementation and O&M of water supply system of PSWCs.	
3-1 DWSU and PSWCs establish monitoring units within the organization.	・Due to the organizational reform of the Ministry of Irrigation and Water Resources to Ministry of Water Resources in December 2011, and then to Ministry of Water Resources and Electricity in July 2012, there has been delay in establishment of the Monitoring Unit in DWSU. Mid-term review team made recommendation to urge the establishment of monitoring units. ・In response, DWSU and PSWC formulated new monitoring and evaluation units by assigning relevant personnel as below. ・DWSU and PSWC prepared term of references (TOR) for monitoring & evaluation units.

	Name of unit	Staff members	Established in
	DWSU	Monitoring and Evaluation Department	5	December 2014
	Sennar SWC	Monitoring Follow-up and Evaluation Unit	9 SWC staff + Each locality/sector office monitoring officer	December 2014
	White Nile SWC	Monitoring and Evaluation Unit	10 SWC staff + Each locality/sector office monitoring officer	December 2014

3-2 DWSU develops the draft version of monitoring manual to be used by PSWCs.

- In Year 3, after the draft monitoring formats has been explained at the JCC meeting (2014.01.29), the 1st monitoring workshop was held for discussing and clarifying purpose of monitoring, monitoring items, monitoring format etc. (2014.02.05). Discussion was made on monitoring seminar involving international organizations (2014.02.25).
- In Year 4, Monitoring and evaluation unit members of DWSU/DWST conducted monitoring workshop in both PSWCs for preparing monitoring plan (1.monitoing of training, 2. SWCs' operational monitoring, 3. Monitoring of water supply facilities), visiting water supply facilities, making presentation of monitoring plan to DG, and clarifying roles of federal level and state level in monitoring process. (White Nile SWC: 2014.10.26-29, Sennar SWC: 2014.11.02-5) Based on the results of these workshop, draft monitoring manual was prepared.
- After completing results of Activity 3-4 in model sites, monitoring workshop was held in both PSWCs for revising monitoring plan, monitoring formats & manual both for training and water yards. Participants also discussed how to strengthen monitoring structure for water yards with information flow from operators of water yards to sector offices (locality), to SWC monitoring unit and to DWSU. (Sennar SWC: 25-28 January 2015, White Nile SWC: 1-4 February 2015)
- As a result, water yard monitoring formats were developed for 1. Baseline survey, 2. Annual survey for SWC monitoring units, 3. Seasonal survey, 4. Monthly survey for SWC locality, and 5. Daily for operators.

3-3 PSWCs implement baseline survey on the O&M status of current water supply system.

- In Year 1, baseline survey was conducted at locality level in two pilot states.
- In Year 3, baseline survey on sanitation environment around water supply facilities was conducted.
- In Year 4, according to the PSWC monitoring plan, monitoring and evaluation unit members with relevant sector office staff in localities & operators on sites have been collecting baseline information utilizing the monitoring manual with water yard monitoring sheets developed in Activity 3-2。

3-4 PSWCs regularly monitor the current situation of training implementation, examples identified in the State, and O&M of water supply system based on the draft of monitoring manual.

(1) Monitoring for training implementation

- According to the monitoring plan ("Sennar SWC Monitoring Plan – Human Resources Development (Training)", "White Nile SWC Monitoring Plan – Human Resources Development (Training)"), both PSWCs regularly prepare and submit Training Monitoring Reports for training to DWST every 3 months.
- Both PSWCs developed "Training database" as well as "SWC staff database". PSWCs training coordinators monitor every course and update database accordingly.

(2) Monitoring for water yard O&M status

- Monitoring and evaluation unit members developed the following monitoring sheets for monitoring water yard O&M status.

Name of format	Purpose
Water yard monitoring sheet for baseline survey	For SWC technical team to monitor baseline of 1. SWL/DWL, 2. Water tariff rate, 3. Water quality checkpoints, 4. Condition of the borehole, 5. Sanitary condition
Water yard monitoring sheet for annual survey	For SWC technical team to annually/seasonally monitor SWL/DWL, 1. Water tariff rate, 2. Water quality checkpoints, 3. Condition of the borehole, 4. Sanitary condition
Water yard monitoring sheet for seasonal survey	
Water yard monitoring sheet for monthly survey	For SWC locality staff (Fee collector/O&M team) to monthly monitor 1. Total condition of facility, 2. Condition of control panel, 3. Condition of tank, 4. Condition of distribution point
Daily monitoring sheet for operators	For Operator to daily record 1. Total condition of facility, 2. Condition of the pump, 3. Operating time (AM/PM), 4. Condition of the generator, 5. Total hours of operation (hour/day)

- In Year 4, monitoring units in the pilot states prepared budget plan for the monitoring water yards in model sites in the selected locality of each state as below. Upon approval of the budget, monitoring team members started monitoring of water yard O&M status in the model sites with participations by DWSU monitoring team members.

<Model sites for water yard monitoring in November 2014 - January 2015>
[Singa locality of Sennar State] Number of target water yard: 116
[Tandalti locality of White Nile State] Number of target water yard: 114

- Monitoring units will conduct the same monitoring activities to cover the rest of the sectors/localities by January 2016.

3-5 DWSU and DWST analyze and evaluate the monitoring result and give feedback

(1) Monitoring of training implementation

- In Year 3 and Year 4, Monitoring Unit of DWSU have disseminated information of monitoring activities for training inplementation (Activity 3-1 – 3-5) to other states through JCC meetings and Joint Seminar.

(2) Monitoring for water yards

- DWSU and PSWCs monitoring unit staff members have been planning to present the results of the monitoring of water yards in Activity 3-4 at the JCC meeting in March 2015.

such as lessons learned and good practices etc. to SWC monitoring unit.	・Based on "Monitoring Plan - Water Supply Facility (Water Yard)" and "Monitoring Manual – Water Yard", it is planned that data collected on site by SWC sector/locality office will be accumulated at PSWC monitoring units. Monitoring & Evaluation units will conduct monthly survey and annual monitoring (twice a year) and submit the results to DWSU monitoring & evaluation department in every six months (February and August).
3-6 DWSU maintains and manages monitoring data at information center.	(1) Monitoring of training implementation ・Utilizing monitoring format for capturing changes in training capacities which was developed in Phase 1. DWST continues maintaining monitoring data of training implementation through Phase 2. The same staff members are assigned for the Information Center and Monitoring and Evaluation department of DWSU and manage monitoring data on training implementation. (2) Monitoring for water yards ・According to the "Monitoring Plan - Water Supply Facility (Water Yard)," as in Activity 3-5, DWSU will receive monitoring data of water yards from PSWCs in every 6 months (February and August) and maintain at the database in DWSU. This database can be utilized to maximize the mobilization of available equipment & materials such as provided by donors so that DWSU can deliver them to adequate locations in various states.
3-7 DWSU finalizes monitoring manual based on the evaluation of monitoring of training courses and O&M of water supply system.	・As in Activity 3-2, DWSU with technical advice by JICA Experts, drafted the monitoring manual (2014.01). After a series of monitoring workshop held in February 2014, October -November 2014 and February 2015, the monitoring manual has been finalized. ・DWSU will distribute "DWSU Monitoring manual - Water Yard. March 2015" and "DWSU/DWST Monitoring manual – Human Resources Development (Training). March 2015" to all SWCs. (planned for March 2015) ・In addition, based on the results of monitoring activities in model sites as in Activity 3-4, both PSWCs monitoring & evaluation units formulated "Action Plan – Water Yard Rehabilitation" in February 2015 for the water yards with high priorities to be fixed (10 in Tendalty locality, White Nile state, 14 in Singa locality, Sennar state).
OUTPUT 4: Training course implementation structure is developed within each SWC in Sudan in collaboration with DWST.	
4-1 DWST develops Human Resources Development Manual to each SWC based on the outputs of 1, 2 and 3.	・DWST started to create human resources development manual along with "Mid-term/long-term human resources development plan 2012-2026". DWST is planning to finalize the manual by March 2015 and distribute it to all SWCs.
4-2 Each SWC (excluding PSWCs) establishes training unit within the organization.	・Each SWC established training centers as below. Since the beginning of the Phase 2 of the Project (November 2011), new training centers were established in White Nile state (November 2011), Sennar sate (April 2012), Northern state (March 2013), River Nile state (January 2014), Gezira state (December 2012), North Kordofan (April 2014), and 3 centers, which supported by UNICEF WES project, in South Kordofan, West Darfur state and South Darfur sate.

Established (including centers under the renovation)	Not established
1. White Nile state (Pilot site), 2. Sennar state (Pilot site), 3. Northern state, 4. River Nile state, 5. Gezira state, 6. Gadaref state, 7. Kassala state, 8. North Kordofan state, 9. Red Sea state (under renovation), 10. South Kordofan state, 11. North Darfur state, 12. West Darfur state, 13. South Darfur state, 14. Blue Nile state (under renovation)	1. Central Darfur state (separated from West Darfur in January 2012) 2. East Darfur state (separated from South Darfur in January 2012) 3. West Kordofan state (separated from South Kordofan in February 2013, planning for establishing a training center)

	・Equipment for training courses were provided for Northern state, River Nile state, Gezira state, Gadaref state and Red Sea state and North Kordofan state in addition to 2 pilot states (Annex 2-5: List of Equipment procured under the Project).
4-3 DWST implements Joint Seminar(s) to share and disseminate the	・Through participating in Joint Seminar, SWCs staff members from different states were able to gather and visit at training centers in other states and discuss issues on training, as well as exchange information. At the same time, by hosting the event in their training centers, SWCs were able to promote their activities to stakeholders not only within the state but also from other states.

outputs of PSWCs' activities, and distribute Human Resource Development Manual to each SWC.		Date	Place	Topic	Participants
	1	2012.04.18	Sennar SWC	・Significance of activities in pilot state training centers presented by JICA experts	41 persons (Sennar state, White Nile state)
	2	2012.11.10	Gezira SWC	・Gezira SWC training center activities and facilities	22 persons (DWST (3), White Nile state (4), Sennar state (2), Northern state (1), Gezira state (8), JICA experts (4))
	3	2013.02.11	White Nile SWC	・Information exchanges of establishment of the training centers, training course implementation, clarification of roles of the central level and the state levels, request for the central level	30 persons (DWST, Gezira state, Red Sea state, Sennar state, North Kordofan state, White Nile state, JICA experts)
	4	2013.11.17	White Nile SWC	・White Nile SWC training center maintenance framework ・Best training center award for Gezira SWC training center ・Presentation by training center directors of DWST, White Nile SWC, Sennar SWC, Kassala SWC, Gezira SWC on characteristics of their centers, training activities and issues	50 persons (DWST, Gezira state, Kassala state, Sennar state, Blue Nile state, North Kordofan state, South Kordofan state, West Darfur state, Hawata Project)
	5	2014.04.28	North Kordofan SWC	・North Kordofan SWC training facility ・Best training center award for Gezira SWC training center ・Reporting of water supply issues and training center activities by North Kordofan state, Northern state, River Nile state, North Darfur state, Sennar state	70 persons (DWST, Northern state, River Nile state, Red Sea state, Gezira state, Sennar state, North Kordofan state, South Kordofan state, North Darfur, Hawata Project)
	6	2014.11.27	Northern SWC	・Northern SWC training center management ・Gedaref SWC training activities and collaboration with international organizations ・South Darfur SWC human resources development ・Sennar SWC training outputs and future plan (training activities, monitoring activities, action plan after the Project period) ・North Kordofan SWC training management (participatory community development through water) ・Gezira SWC monitoring water resources management, Water Atlas activities ・Collaboration framework with DWST	40 persons (Northern state, Dongola Univ., River Nile state, White Nile state, Sennar state, Gedaref state, Red Sea state, North Kordofan state, Gezira state, Hawata project, West Darfur state, South Darfur state)
	7	2015.08-09 (plan)	DWST	・Discussion on assessment of the training centers established in each state, activities for future etc.	

4-4 Each SWC (excluding PSWCs) develops training course implementation plan.

・SWCs plan and implement training courses with technical advices by DWST, PSWCs and JICA Experts as below.

SWC (No. of participants in DWST Training, 2008-2014)	Training facility ◎Established, ▲Rehabilitation, × No plan	Training in 2014		Budget (SDG)*		Remarks (Plan for 2015 etc.)
		Completed Course	No. of trainees	2014	2015 (plan)	
Northern state (60)	◎	7	104	432,360	425,680	-Plan for 2015: 15 courses (GIS, organization of director, financial report, English, pipe network design, water supply facilities, statistics, engineering law), Human Resource Development Awareness training seminar, Procurement of laboratory equipment from Italy (200,000 SDG), Income generation plan to invest on the training center open area as ceremonial hall for public, Income generation plan to expand the workshop to serve car maintenance commercially.
River Nile state (76)	◎	7	96	166,063	140,000	- Plan for 2015: 7 courses (O&M of drinking water plants, Computer-MS Excel, MS Word, Human resources management, GIS, Installation of maintenance of drinking water networks
Gezira state (91)	◎	18	302	361,400	542,100	- Total cost for establishment of the center: 1,479,550 SDG - Plan for 2015: Rehabilitation of workshop, 19 courses (monitoring and evaluation, reporting, hand pumps O&M, management of distribution network, community awareness, water supply facilities – electromechanical for technicians and skilled labors, technical specifications of sanitation system – construction workers, well management, personal database, GIS, computerization of financial actions, procurement and supply database, computer skills)
Gedaref state (60)	◎	-	-	15,000	250,000	- Plan for 2015: Training for engineers customer care, and labors
Kassala state (82)	◎	1	14	-	350,000	- In 2014, finance training was implemented as a first program. - Plan for 2015: Targeting 155 persons (Admin 15, Finance 45, PC Skill 20, Technical Engineering/Electricity maintenance 15, Water Yard Operators 50, DWST 10)
Red Sea state (40)	▲	1	20	35,000	10,000-	
Blue Nile state (74)	▲	2	-	-	-	In 2014, training courses were implemented for maintenance of water stations, management of water yards. Plan for 2015: 4 courses (Accounting, Customers accounts, O&M and Total Station (GPS), Approximately 20 trainees (technicians, engineers)

North Kordofan state (65)	◎	25	516	95,000	528,212	- Plan for 2015: 39 training courses (target: 1,380 trainees), Establishing mineral water factory, Construction of T/C dormitory, Construction of mini water yard, Initiating the Community Leadership Total Sanitation (CLTS) in basic schools
South Kordofan state (153)	◎	-	-	-	-	
West Kordofan state (17)	▲	-	-	-	-	
South Darfur state (124)	◎	0	0	-	-	- OJT is implemented by support of UNICEF - 5 courses planned for 2015-16
West Darfur state (119)	◎	1	30	20,000	60,000	- Plan for 2015: 9 courses (water quality, database, reporting skills)
East Darfur state (35)	×	-	-	-	-	
Central Darfur state (44)	×	-	-	72,000	210,800	Actual for 2014: 7 training (geophysical study, water quality, pump operators, community mobilization, hand pump mechanic, chlorinators, IWRM) for 245 persons Plan for 2015: 13 training (water facility management, community base operation and maintenance, pump operators, hand pump mechanic, chlorinators, solar systems technology, raising awareness of the decision makers, drilling procurement skills, human resources and accounting, mentoring and evaluation, water harvesting, IWRM) for 587 persons
North Darfur state (108)	◎	1	30	100,000	700,000	Plan for 2015: ToT training for 125 persons
Khartoum state (38)	◎	-	-	-	-	

*Budget figures for some SWCs are for the whole SWC budge (not only for training budget)
Source: Documents prepared by DWST & JICA Experts, SWCs' response to the questionnaire

List of Meetings

(1) Joint Coordinating Committee Meeting

	Date	Topics	Participants
1	2011.12.15	- Project activities - Amendment of PDM	38 (PWC, PWCT, South Darfur SWC, North Darfur SWC, West Darfur SWC, Red Sea SWC, White Nile SWC, Northern SWC, North Kordofan SWC, River Nile SWC, El Gezira SWC, Blue Nile SWC, Kassala SWC, Khartoum SWC, Ministry of Water Resources, Ministry of Finance, Embassy of Japan, JICA Sudan Office, JICA Experts)
2	2012.06.27	- Achievement of Year 1 activity - PDM - Mid and Long term Human Resources Development Plan	40 (PWC, PWCT, Northern SWC, West Darfur, North Darfur SWC, River Nile SWC, South Darfur SWC, South Kordofan SWC, North Kordofan SWC, Blue Nile SWC, Red Sea SWC, Kassala SWC, White Nile SWC, Sennar SWC, Gadaref SWC, El Gezira SWC, El Hawata W.C., MIC, Embassy of Japan, JICA Sudan Office, JICA Experts)
3	2012.11.08	- Work plan for Year 2	37 (White Nile SWC, North Darfur SWC, Northern SWC, White Nile SWC, South Darfur SWC, Sennar SWC, South Kordofan SWC, River Nile SWC, El Gezira SWC, Kassala SWC, Red Sear SWC, West Darfur SWC, UNOPS, Embassy of Japan, JICA Sudan Office, JICA Experts)
4	2013.04.30	- Amendment of PDM according to the change from PWC to DWSU, PWCT to DWST,	34 (PWC, PWCT, White Nile SWC, North Darfur, Northern SWC, White Nile SWC, North Kordofan SWC, South Darfur SWC, Sennar SWC, South Kordofan SWC, Sennar SWC, River Nile SWC, El Gezira SWC, Kassala SWC, Red Sear SWC, West Darfur SWC, UNOPS, Embassy of Japan, JICA Sudan Office, JICA Experts)
5	2013.10.31	- Year 3 work plan and issues to be solved - Amendment of PDM	43 (DWSU, DWST, Northern SWC, River Nile SWC, Gedaref SWC, Red Sea SWC, Sennar SWC, White Nile SWC, North Kordofan SWC, Blue Nile SWC, South Kordofan SWC, West Kordofan SWC, North Darfur SWC, West Darfur SWC, South Darfur SWC, Central Darfur SWC, East Darfur SWC, El Hawata W.C, UNOPS, Embassy of Japan, JICA Sudan office, JICA experts)
6	2014.01.29	- Reporting of the Mid-term review of the Project - Amendment of PDM - Discussion on the monitoring format	45 (DWSU, DWST, Northern SWC, Khartoum SWC, Kassala SWC, Sennar SWC, White Nile SWC, North Kordofan SWC, Blue Nile SWC, North Darfur SWC, South Darfur SWC, Central Darfur SWC, East Darfur SWC, El Hawata W.C, UNOPS, Embassy of Japan, JICA Sudan office, JICA experts)
7	2014.05.28	- Achievement of Year 3 activities and issues to be solved - Community development approach - Result of the training in Morocco - New training center - Handing over of the equipment	44 (DWSU, DWST, Northern SWC, Gedaref SWC, Kassala SWC, Red sea SWC, Sennar SWC, White Nile SWC, North Kordofan SWC, Blue Nile SWC, South Kordofan SWC, West Kordofan SWC, North Darfur SWC, West Darfur SWC, South Darfur SWC, Central Darfur SWC, East Darfur SWC, El Hawata W.C., UNOPS, Embassy of Japan, JICA Sudan office, JICA experts)

ANNEX 3: Results of the evaluation

3-2 Evaluation by Five Criteria

Verification of Performance & Implementation Process

	Evaluation questions		Survey Results
	Main Questions	Sub-Questions	
Verification of Performance	Is the Input allocated as planned?	<Japan>	
		Have Japanese Experts been dispatched as planned?	Japanese experts were dispatched as planned. (see Annex 2-1: Placement records of Japanese experts)
		Have necessary equipment been installed / provided as planned?	Necessary equipment mostly for training activities have been installed and provided as planned. The plan of A/C installation which was originally procured for the new Kilo Ten training center, was changed due to the delay in construction by the Sudanese side. DWSU and JICA Experts decided to set them up temporarily in the existing training center building instead. (See Annex 2-4: List of equipment procured under the Project)
		Is there any problem in availability and maintenance of equipment?	Trained C/Ps appropriately maintain equipment procured by the Project. (See Annex 2-4: List of equipment procured under the Project)
		Was the C/P Training implemented as planned?	Training in Morocco was planned and implemented for C/Ps as planned. (See Annex 2-2)
		What is provided as local cost by Japanese side?	Total amount of 3,118,466 SDG are provided for activity costs by Japanese side. (See Annex 2-3: Local cost from Japanese side)
		<Sudan>	
		Were the C/P and management staff appointed as planned?	Placement of C/Ps by DWSU, DWST, and both PSWCs are completed in Year 3 when personnel for newly formulated monitoring and evaluation units were appointed. (See Annex 2-5: Placement records of Sudanese counterparts)
		Were the Project office, furniture, communication network, and facilities equipped as planned? Was the Kilo ten training center built?	DWST and PSWCs provided project office space with furniture and communication network. Kilo Ten Training Center of DWSU which was supposed to be built in the early stage of the Project is still under construction due to delay in financing.
	Have the Outputs been produced as planned? (Compare with target indicator)	[Output1] Training courses are implemented by DWST based on its midterm/ long-term human resources development plan. <Indicator1-1>Mid-term/long-term human resources development plan is completed by March 2013. <Indicator1-2>Percentage of contributions from training coordinator on the planning and implementation of training courses increases by 100%. <Indicator1-3>Training courses at DWST are implemented more than 20 times annually.	<Indicator 1-1>: Based on "Quarter Century Strategy for Water Supply 2011-2031", DWST prepared the outline of the "Mid-term and Long-Term Human Resources Developments Plan 2012-2026." JCC discussed and approved it at the 2nd JCC meeting on 27 June 2012. In February 2015, DWST submitted the final draft of the plan to the Federal Ministry of Water Resources and Electricity (MoWRE). Once the MoWRE approves it, DWST will submit the final version to the Federal Ministry of Human Resources Development (MoHRD) for approval and issuing the certificate of authorization by August 2015. <Indicator 1-2>: By the Mid-term review in January 2014, it has been confirmed that contribution rates of the DWST training coordinators reached 100%. <Indicator 1-3>: DWST implemented training courses for 18 times in 2011, 21 times in 2012, 28 times in 2013, and 23 times in 2014.
		[Output2] Training course implementation structures in PSWCs are developed by PSWCs in collaboration with DWST. <Indicator 2-1>Percentage of contributions from training coordinators on the planning and implementation of training courses is increased by 80% in the PSWCs <Indicator 2-2>Training courses are implemented according to the SWC training implementation plan.	<Indicator 2-1>: By the end of Year 3, contribution rates of the training coordinators reached 86.4% for White Nile SWC and 85.8% for Sennar SWC. <Indicator 2-2>: According to the annual training implementation plan prepared, each PSWC have implemented the more courses than the previous years. White Nile SWC: 7 courses (8 times) in 2012, 8 courses (9 times) in 2013, 8 courses (12 times) in 2014 Sennar SWC: 6 courses (9 times) in 2012, 13 courses (17 times) in 2013, 11 courses (14 times) in 2014
		[Output3] Monitoring system is established within DWSU and pilot SWCs for training course implementation and O&M of water supply system of PSWCs. <Indicator 3-1>Monitoring manual is completed by March 2015. <Indicator 3-2>Monitoring activities are implemented according to schedule.	<Indicator 3-1>: "DWSU Monitoring Manual – Water Yard" and "DWSU/DWST Monitoring Manual – Human Resources Development (Training)" have been created by March 2015 and will be distributed to all SWCs in the JCC meeting. <Indicator 3-2>: (1) Training implementation: Monitoring activities for training implementation have been conducted by DWST and PSWCT along with their annual training plan. (2) O&M of water supply system (Water yards): Based on the monitoring format developed, PSWCs conducted monitoring activities of the water yards in model sites: 114 site in Tendalty locality, White Nile state and 116 sites in Shinga locality, Sennar state (2015.02).
		[Output4] Training course implementation structure is developed within each SWC in Sudan in collaboration with DWST. <Indicator 4-1>Human resources development manual is	<Indicator 4-1>: DWSU started developing the "DWSU Human Resources Development Manual" along with "Mid-term and Long-Term Human Resources Developments Plan 2012-2026." DWSU is planning to finalize the manual by March 2015 and distribute it to all SWCs. <Indicator 4-2>: Joint seminar has been implemented 6 times by November 2014 and planned for the 7th seminar in August or September 2015 for sharing outputs of PSWCs as well as achievement of other newly established SWC training centers. (Annex 3-1: Activity 4-3)

		completed by March 2015. <Indicator 4-2>Joint Seminar to share and disseminate the outputs of PSWCs are implemented 6 times.	
	Are there prospects that the Project Purpose will be achieved?	"Human resources in water supply sector are properly trained in Sudan." Indicator 1: The number of trainees that are trained in Sudan exceeds 2000. Indicator 2: The number of annually maintained water yards is increased to more than 20 in each PSWC.	Indicator 1: Total number of training participants reached 1,629 in DWST and 625 in PSWCs as of January 2015. Thus in total, the number of trainees who were trained in Sudan exceeds 2,254. (Annex 3-1: Activity 1-4)
			Indicator 2: Renovation and maintenance of the water yards (pump, control panel, generator, well rehabilitation, water tap, elevated tank, pipes, and others) have been conducted for more than 20 in each PSWC in Year 4 as below. Sennar state: 32 sites (57 items) in 6 localities (2014.10.01-2015.02.02) White Nile state: 48 sites (85 items) in 3 localities (2014.10.02-2015.02.20)
	Are there prospects that the Overall Goal will be achieved?	"Water supply system is properly managed in Sudan." Indicator 1: SWC staff utilizes their knowledge and technical skills to maintain and operate water supply facilities.	- Trainees of well management, electrical management, mechanical management, equipment management and pipe network management engage in rehabilitation of borehole (air lift), pumps, control panels, generators, elevated tanks and pipes during and after the courses. - Trainees of community development involved in rehabilitation of water yard environment during the training. - Ex-trainees of pipe network management engage in rehabilitation of pipes as well as designing of distribution network. - Ex-trainees of water quality management revised water analysis database both for water treatment plant and water yards as well as the reporting format for analysis results. - Ex-trainee of database management and GIS/Remote sensing developed database of water facilities, water yards, alarming system for rehabilitation needs, consumption of electricity for operating water facilities and customer account as well as administrative and personnel information of the sector.
Verification of Implementation Process	Are activities implemented as planned?	Have the Project activities been implemented in line with the initial PO?	Project activities have been implemented in line with the initial PO for Output 2 & 4. However, there are some changes in pre-condition for Output 1 & Output 3 as below.
		What are the reasons of the changes in plan on activity implementation?	Output 1: Due to delay in construction of the new training center by DWSU, which was indicated as Sudanese side in puts in PDM, DWST has to continue implementation of training courses in the existing facilities. Output 3: Due to delay in formulation of monitoring units, monitoring activities for water yards under Output 3 were implemented after DWSU & PSWCs assigned their staff members to monitoring units in Year 3.
		Has the change in PO been processed adequately?	Changes in PO have been processed adequately according to the amendment of PDM upon recommendation made by the Mid-term Review mission.
		How are the progress of the activities which had been implemented differently from the original PO?	Output 1: Regardless of the delay in construction of the new training center, DWST has achieved Output 1. Output 3: PSWCs have been implementing monitoring activities of water yards in the model sites in Year 4. The results have been reflected to the monitoring plan for the entire state and the monitoring manual.
	Is there any problem in the transfer method for skill/ knowledge/ techniques?	What is a major point in measures of technology transfer?	- Utilizing multiple resources developed in Phase 1, techniques and knowledge necessary for the water supply system management were gained by the participants from all over the country through training courses in DWST and PSWC. - Starting from Phase 1, SWCs (e.g. Kassala state, Gezira state) have involved in the expansion of the technical transfer through dispatching their staff members as training course instructors to DWST and PSWCs. - Information and opinion exchange opportunities have increased among C/Ps through DWST training and the Joint Seminar. - Training in Morocco and dispatch of experts from Morocco have led to mutual effects both on Sudanese side and Moroccan side. - Mutual effects have been identified through collaboration with other JICA technical cooperation projects and JOCV. - "The Project for improvement of water treatment plant in Kosti city" collaborates with survey in the target areas. Kosti special training has been conducted for C/Ps of the grant project so as to increase capacities in management of mechanics, equipment and electricity.
		Is there any problem in contents of technology transfer?	There is no problem in contents of technology transfer. For future, training topics shall be added in response to changes in needs and further improvement of the water supply sector in each state.
		Have the concept of training implementation framework, budget proposal, training contribution measurement etc. been understood by the C/Ps?	- Concept of training management cycle and the evaluation method which were developed in DWST in Phase 1 have been modified and utilized by C/Ps at PSWCs. - In Phase 1, DSWT analyzed training costs and developed budget planning method which has been continuously used by DWST C/Ps. - At the PSWCs, C/Ps are able to accurately manage budget planning and especially in Year 3 & 4, timely disbursement by state governments, which understand the importance of human resources development activities. As a resulted, the planned training courses are implemented as planned. - DWST issues the certificate for the trainees with high technical levels in order to encourage trainees' participations and their work.
	Is there any problem in the project management system?	- Communication level between JICA Sudan Office and the Project - How is the Project monitored? - How did the Project improve by monitoring?	Through JCC meetings, series of the Joint Seminar and regular meetings of SWC DGs with DWSU and DWST, communication among counterparts have been activated. In addition, foundation of relationship among C/P organizations had already developed through Phase 1 since most of the training center directors of SWCs participated in the series of the training courses in DWST during Phase 1. JICA Sudan Office has involved in Project activities such as JCC, Joint Seminar and Training in Morocco etc.

	Does the project have a high recognition in the implementing agency, C/P, and Target Groups?	Level of recognition of DWSU, DWST, SWCs and target groups toward the Project activities?	Through the Phase 1 and Phase 2, DWSU and DWST staff members highly recognize the Project activities. SWCs are also highly recognize the Project as reflected in the establishment and operations of training centers in 14 states and the active participations by all SWCs in JCC, Joint Seminar and training activities. In the Phase 1, executive staff members and engineers of SWCs were core targets of the capacity development on series of training courses at DWST. They were responsible to disseminating their trained skills and knowledge to their colleagues. In Phase 2, once they established training centers, they became directors of these centers. Some of them became the Director General of SWC.
		Level of participation of DWSU, DWST, SWCs to activities	
	Were C/Ps assigned as planned?	Are the C/Ps of DWSU, DWST, and SWCs appointed as planned?	C/Ps of DWSU, DWST and SWCs were appointed mostly as planned and with some delay for establishment of monitoring and evaluation department/units of DWSU and PSWCs which members were assigned in Year 3.
		Was C/P of DWSU, DWST, and SWC appropriate in terms of number, position, and capacity?	C/Ps were assigned appropriately by DWSU, DWST and SWCs in terms of number, position, and capacities. (See Annex 2-5: Placement record of Sudanese counterparts) Especially those who were trained in the Phase 1 played the significant roles as the training center directors of SWCs as well as training instructors and coordinators for various courses (e.g. water analysis, organizational management, well management, electrical/equipment/mechanical management, data management, water treatment plant, pipe network management) in PSWCs.
		To what extent does the Project involve other stakeholders than T/G?	Through training activities and Joint seminar, other local organizations (e.g. Hawata water corporation, women's association) besides SWCs involved in the Project as trainees. International organizations collaborated with DWST in human resources development in the water supply sector.
	Did any other problems occur during the process of implementing the project? What is the cause?	What was the problem if there is any?	Major issues occurred during the process of implementing the Project were pointed out by the Mid-term review team. DWSU, DWST, SWCs responded to those issues based according to the recommendation by the Mid-term review team as below.
		What was the cause of the problem?	
		How has the project dealt with such issue (s) if any?	
	How did the recommendation of the Mid-term Review been utilized?	1) Construction of a new Kilo Ten training center	With attempt of DWSU to solve the funding issues for construction of Kilo Ten training center, there had been discussion among relevant parties of DWSU and the donor. However, the construction of the training center building is unlikely to complete within the Project period.
		2) Assigning a sanitation expert in DWSU	DWSU newly assigned sanitation coordinator in June 2014. MoWRE and MoH had discussion to clarify their roles in sanitation management at the community level
		3) Establishing monitoring units	DWSU and PSWCs formulated monitoring and evaluation department/units with allocation of current staff members in December 2014.
		4) Develop business mind and management capacities	- Shinga sector director of Sennar state introduced various database to the sector office including clients' data of electricity consumption and tariff collection, consumption of electricity to run water yards, alarming system to record about facilities in needs of rehabilitation. - Northern SWC training center has planned to utilize training facilities for income generating through providing car maintenance and repairing services as well as through vocational training.
		What changes were brought about from the revision of PDM in indicators of the project purpose & outcomes and important assumption to achieve the overall goal?	After amendment of PDM (to Version 5.0), indicators of the Outputs were better clarified among counterparts to match the actual condition. As a results, activities especially under Output 3 have been accelerated in terms of monitoring of the water yards by PSWCs.

Evaluation results by 5 evaluation criteria

	Evaluation Questions		Survey Results
	Main Questions	Sub-Questions	
RELEVANCE	Needs	Is the Project in line with the issues & needs of the Water Supply Sector of Sudan?	As stated in IPRSP, the key challenges in the area of safe water provision in Sudan include 1) inadequate sector policies, plans, implementation and coordination, 2) lack of resources for investment in conservation, water quality and monitoring, 3) lack of community awareness of water supply & sanitation issues, and 4) the poor record of sustainability of interventions for which DWSU, DWST and SWCs with localities are responsible. And training courses in DWST and PSWCs were designed based on needs and issues of each state identified through the Project activities.
		Is the Project in line with the needs of the C/Ps in DWSU, DWST, and SWCs?	
	Priority	Is the project purpose "Human resources in water supply sector are properly trained in Sudan." in line with the development policy/plan of Sudan?	The Project purpose is in line with "Quarter Century Strategic Plan for Water Supply (2007-2031)", "Water Sanitation and Hygiene (WASH) sector policy (2010)", "Water Sanitation and Hygiene Sector Strategic Plan (2011-2016)", "Sudan Interim Poverty Reduction Strategy Paper (IPRSP) (2012)".
		Is the project consistent with Japan's country strategy for Sudan?	Japanese development assistance policy for Sudan is to contribute on promoting sustainable peace through improvement of basic infrastructure and poverty reduction. Improvement and maintenance & management of the water and sanitation infrastructure is one of the priorities. And the Project is identified as the part of the "Water and Sanitation Support Program, which aims to strengthen water & sanitation facilities and management capacities as well as improvement of public service of the water supply sector.
	Project's strategy & approach	Is there any mutual effect by collaborating with other JICA projects and scheme (JOCVs, Third Country Training Program, Grant etc.)?	Mutual effects have been identified through collaboration with other JICA Projects and schemes as below; "Capacity development project for the provision of services for basic human needs in Kassala", "Project for Human Resources Development for Darfur and the Three Protocol Areas", "Frontline maternal and child health empowerment project phase 2", "Project for improvement of water treatment plant in Kosti city", JOCV (Electric/Electronics) for implementation of the training courses in PSWCs, and Training in Morocco and dispatch of experts from Morocco.
		Is the selection of C/P and target groups appropriate?	It was appropriate to select White Nile state and Sennar state for pilot states in term of their locations next to each other and convenience, as well as their organizational characteristics of administration and enthusiasm.
		Is the approach adopted by the Project appropriate for the Project Purpose?	The Project adopted appropriate approaches of strengthening the training structures of DWST and PSWCs, and establishing the monitoring system for training implementation and O&M of water supply facilities (water yard) in order to achieve proper training of human resources of the water supply sector.
		Is there any mutual effect by collaborating with other development partners?	UNOPS, AfDB and IOM, which implement programs in Darfur states, South Kordofan state,West Kordofan state, and Abyei administrative area, have dispatched beneficiaries of the programs to the training courses in DWST. These collaborations resulted in expansion of DWST's outreach services at the central level to those state difficult to travel in. Through community development and sanitation management training courses, collaboration has been made with WES office supported by UNICEF.
	Japan's advantage in technology and experiences	Has Japanese experience in the water supply sector been utilized in this project?	Japanese ODA to Sudan in the water supply sector started in the 70s utilizing its technical expertise for rehabilitation of water supply facilities etc. In addition, the Project utilized resources of Moroccan water resources management authorities which achieved development the water supply system with involvement of technical cooperation by JICA since the 80s.
	Other points (changes after Mid-term review)	Is there any change in Japan's development policy for Sudan?	There is no change in Japan's development policy for Sudan (issued in December 2012) and the rolling plan (issued in April 2014) which includes assistance for the water and sanitation sector
		Is there any change in policies of Sudan for the water supply sector?	There is no change in policies of Sudan for the water, sanitation and hygiene sector after the Mid-term review in January 2014.
		Is there any significant economic & social change in Sudan?	- After the Mid-term review in January 2014, there is no significant economic and social change. Sudanese economy has still been in recession after losing three-quarters of its oil production associated with the secession of South Sudan in 2011. Government of Sudan has continued austerity measures. - Conflicts in Darfur states, South Kordofan state, and the Blue Nile state have been affecting livelihood of the population in these areas.
EFFECTIVENESS	Achievement forecast for the Project Purpose	Did the number of trainees that are trained in Sudan exceed 2000? (Indicator 1)	By the end of 2014, total number of training participants reached 1,629 in DWST and 941 in PSWCs. Thus in total, the number of trainees who were trained in Sudan exceeds 2,254.
		Did the number of annually maintained water yards increase to more than 20 in each PSWC? (Indicator 2)	Renovation and maintenance of the water yards (pump, control panel, generator, well rehabilitation, water tap, elevated tank, pipes, and others) have been conducted for more than 20 in each PSWC in Year 4 as below. - Sennar state: 32 sites (57 items) in 6 localities (2014.10.01-2015.02.02) - White Nile state: 48 sites (85 items) in 3 localities (2014.10.02-2015.02.20)
	Achievement of Outputs	Have 4 Outputs been achieved (will be achieved)?	All indicators of Output 1, Output 2, Outputs 3 and Output 4 have mostly been achieved by the time of the terminal evaluation and will be fully achieved by the end of the Project period.
	Causal relations between Outputs and Project Purpose	Has the Outputs led the proper training of human resources in water supply sector in Sudan?	All of the 4 Outputs have led to the improvement in training quality for human resources in the water supply sector in DWST, PSWCs and other SWCs with training center, as well as improvement of capacities in monitoring water yards O&M status in pilot states.
		What were the contributing factors besides Outputs for achievement of the Project Purpose?	Training in Morocco and collaboration with international organizations and other JICA projects made DWSU & DWST possible to provide outreach training services and information sharing opportunities to SWCs staff members in distance especially in those areas where security conditions are unstable.

	Constraints to achieve Project Purpose	What were the constraints for proper training of human resources in water supply sector in Sudan?	As in PDM, the pre-condition for the project framework includes "Political conflicts do not occur." On the other hand, in 5 Darfur states, South Kordofan state, West Kordofan state, and Blue Nile state where conflicts persist, there has been limitations for achieving the Project Purpose in comparison with other states with stable security condition. Due to travel limitation of DWST staff as well as travel restrictions of JICA Experts to these areas, it has been hindering the Project to provide on-site technical transfer directly by DWST and JICA Experts.
	Are the important assumptions still appropriate?	Have the necessary budget, personnel, equipment, etc. been provided in a timely and appropriately? Is there any influence on the attainment of the Project purpose?	DWST and PSWCs allocated necessary training budget annually with slight delay in disbursement. As mentioned in "Inputs from Sudan" above, there have been delay in formulation of monitoring and evaluation units and construction of new Kilo Ten training center.
	Utilization of lessons from other JICA projects and scheme and other development partners.	What has the Project learnt from other JICA projects/programs?	- Training in Morocco and dispatch of experts from Morocco brought about initiation of South-South cooperation between Sudan and Morocco in human resources development of the water supply sector. Morocco was selected as the partner of the Project because of their significant achievement in water supply sector development also with technical cooperation by JICA since the 90s. Relevant C/Ps in Sudan gained knowledge and skills through lessons shared with the Moroccan water supply authorities. - "Capacity development project for the provision of services for basic human needs in Kassala" shared its resources through dispatch of training instructors from Kassala SWC in well management, water tariff collection, urban water supply etc.
EFFICIENCY	Achievement level of the Output	Have four Outputs achieved?	All indicators of Output 1, Output 2, Outputs 3 and Output 4 have mostly been achieved by the time of the terminal evaluation. Output 1, Output 2, Output 4 will be fully achieved by the end of the Project period. On the other hand Output 3 could have achieved more if activities started earlier than Year 3.
	Inputs from Japan	Have the Japanese Experts been dispatched appropriately in terms of its number, expertise, and timing? Have the procurement & installment of the equipment conducted appropriately in terms of its number and timing? Have they been utilized?	- Inputs from the Japanese side were appropriate in terms of number, expertise, and timing of dispatching experts and providing equipment. Regarding Output 3, in order to adopt the developed monitoring structure at the state level to cover both training implementation in PSWCs and O&M of water supply facilities for the entire states, the longer term and the larger inputs are necessary. - Equipment procured by the Project are utilized through the training courses at DWST and SWCs. - A/C installation plan which was originally for the new Kilo-ten training center was changed due to the delay in construction. DWSU and JICA Experts decided to install them temporarily in the existing center.
	Inputs from Sudan	Have C/Ps and operations staff been allocated appropriately? Have the work conditions and necessary inputs of the activities been provided/ installed appropriately?	- C/Ps and operations staff have been allocated in the timely manner to cover Output 1, 2, & 4 activities. Because of delay in formulation of the monitoring units, there was delay in allocation of C/Ps specifically for monitoring activities under Output 3 till Year 4. - DWST and PSWCs provided project office space, training facilities and necessary expenses appropriately for operation of the planned activities.
		Has the construction of Kilo Ten Training Center been conducted as planned?	Construction of the new training center has been delayed because of contracting issue with the failure of the tender as well as funding arrangement.
		Have DWSU, DWST, and SWCs allocated budget for the Project activities in the target areas as planned?	DWSU, DWST and SWCs allocated necessary budget for the Project activities from their annual training budget as planned.
	Cost	Have the Output been achieved to appropriate level in terms of cost?	All of the outputs are expected to be achieved to the appropriate level within the Project period. However, it has been recognized that more resources and time are necessary for SWCs to adopt and functionalize the monitoring system for O&M of the water facilities (water yard) in the entire state.
	Causal relations	Were the activities sufficient to produce Outputs?	Activities have been implemented sufficiently by DWSU, DWST and PSWCs as well as other SWCs to produce all of the 4 outputs.
		How was the process to produce Outputs? Are there any approach (activity) more efficient than actual?	Regardless of the delay in delivery of inputs as mentioned above, all the activities contributed to produce 4 outputs. If the training activities could implemented in the larger scale at the new training center, DWST could apply new curriculum with upgraded capacities in term of human resources and facilities.
	Contributing/Hindering factors to achievements of the Outputs	Is there any contributing factor for the achievement of the Outputs? - Utilization of equipment/ facilities/ trained human resources by the former/ similar projects - Was there any collaboration with other JICA projects and projects by other donors?	- Utilization of core target groups of Phase 1 who were trained through a series of different courses, have performed important roles as training center director, coordinator and monitoring and evaluation team members in Phase 2. - Utilization of equipment provided for SWC training centers resulted in achieving implementation of planned training courses with improved training environment. - Collaboration with other JICA projects which have components of capacity development in the water supply sector have resulted in more efficient management of the Project. - Collaboration with other international organizations including UNOPS, AfDB, UNICEF and other organizations such as Hawata Water Corporation, universities, private sectors have made the DWST & PSWCs enrich with outreach training service with utilization of expertise in human resources development in the water supply sector. - Training in Morocco and dispatching Moroccan experts have been the contributing factors which stimulated Sudanese C/Ps through direct dialog with Moroccan counterparts in Arabic.

		Is there any hindering factor for the achievement of Output?	Regarding Output 1, the delay in construction of the Kilo Ten training center has hindered the development of training structure as intended initially. Regarding Output 3, lack of accumulated data and information about the water facilities in the state level has been the hindering factor for activities of monitoring O&M of the water supply facilities.
	Are the important assumptions still appropriate?	Is there any influence on the attainment of the Outputs? [Important Assumption]: 1. Budget of DWSU, DWST, and SWCs does not drastically decrease. 2. Organizational restructuring does not occur for counterparts. 3. The number of trained SWC staff leaving the organization is not significant. 4. Budget, human resources, and necessary equipment for project implementation are properly provided.	1. In Phase 2, Sennar SWC and White Nile SWC have constantly secured annual training budget regardless of the high inflation rates. 2. Due to the organizational reform of the Ministry of Irrigation and Water Resources to Ministry of Water Resources in December 2011, and then to Ministry of Water Resources and Electricity in July 2012, Public Water Corporation also reformed to Drinking Water and Sanitation Unit in 2013. As a result, there has been delay in establishment of the Monitoring and Evaluation Department in DWSU. Mid-term review team made recommendation to urge the establishment of the monitoring units. In response, new units for monitoring and evaluation were formulated in DWSU and PSWCs. 3. 17 staff members of DWST are working on implementation of the training courses. Total number of DWST staff members engaging in training course activities since Phase 1 is now 10 persons. DWST has been managing with their training activities with . However, if the DWST faces higher staff turnover rates, there will be more threats to the sustainability of the Project outputs in future. 4. Budget, human resources and necessary equipment have been provided by DWSU, DWST, and PSWCs for the project implementation except new training center which is still under the funding arrangement.
IMPACT	Achievement forecast for the Overall Goal	"Water supply system is properly managed in Sudan." <Indicator 1>: SWC staff utilizes their knowledge and technical skills to maintain and operate water supply facilities.	If necessary inputs such as budget and equipment are allocated especially for O&M of water supply facilities at the state level in the sustainable manner, trained SWC staff members will be able to properly manage the water supply facilities utilizing their knowledge & skills. However, in order to ensure achievement of the overall goal, it is prerequisite to establish the monitoring framework at every state and systematically grasp the situation of the existing water supply facilities in Sudan.
	Continuity of achievement of overall goal	Is there possibility for DWSU and state government to continue budgeting and regulating necessary for training activities and maintaining/repairing facilities?	- Upon approval of the "Mid-term/long-term human resources development plan 2012-2026" by MoHRD, DWSU is likely to be able to manage budget and regulations essential for training activities. - By "Water Sanitation and Hygiene (WASH) Sector Strategic Plan (2011-2016)" for each state and human resources development action plan for 2016-2018 for PSWCs, those SWCs, which have been managing training activities are highly likely to continue securing budget and necessary regulations for human resources development by the state government.
	Causal relationships	Is the Overall Goal still logically linked to the Project Purpose given the current situation?	The Project Purpose is logically linked to the Overall goal although there are important assumptions to be fulfilled as below.
		Is there possibility of fulfillment of important assumptions to keep the achievement of overall goal? Has there been any effect of these assumptions? [Importance Assumptions]: 1. PSWC's staff who completed training courses do not leave SWC. 2. There are no climate changes or disasters that affect the operations water facilities. 3. Necessary budget, personnel, equipment, etc. are provided in SWC at the appropriate timing.	1. At White Nile SWC and Sennnar SWC, trained staff members have been working as training coordinators as well as instructors for some courses. 2. During the Project, there was no effect of climate change or disaster on the operations of water facilities. 3. PSWCs have constantly secured annual budget for training activities as well as monitoring activities during the Project period. On the other hand O&M costs have been covered by water tariff in PSWCs at each locality/sector office. However, PSWCs face insufficiency of budget for spare parts, upgrading equipment and developing water facilities, PSWCs rely on financial resources from state government and federal government.
	Hindering factors	Is there any factor hindering the overall goal in the following aspects? - Policy, law, regulations - Financial - Organizational (DWSU, DWST, SWC)	- O&M of water yards are managed by each locality office with water tariff. However, due to legislation of water tariff which is normally set lower than proposal of SWC, it is not sufficient to perform O&M for all water facilities fully. It is commonly the challenges for SWCs to secure for spare parts, upgrading equipment and rehabilitation of water facilities since financial resources are from state government.
	Ripple effects	Is there any influence of the Project on the following factors? - Policy, law, regulations, financial - Organizational (DWSU, DWST, SWC) - Skill/technologies - Economic influence to DWSU, DWST, SWC and related stakeholders in Sudan -Environment, gender, human rights, poverty reduction	- As the reputation of DWST increases, there have been more inquiry from international organizations and local organizations for training courses at DWST. - Participants of training in Morocco gained not only technical skills and knowledge but also sense of ownership towards their organization. It can be seen in improvement of their work environment. - In Shinga and Kosti water treatment plant, laboratory staff changed data recording method from the paper basis to computer basis along with the development of monitoring format for water analysis. - Well management training was conducted in the target hospital of the "Frontline maternal and child health empowerment project" in Sennar which had problems in quantity of water supply. As a result of repairmen of the facilities, water supply condition has improved in the hospital. - Through sanitation management training at the pilot SWC training center, participants from community organizations such as the Women's association increased their awareness of sanitation of water supply facilities in community. As a result, they have planned to prepare information materials to disseminate sanitation education at the community level as well as to establish a health cooperative. - It has been stimulating factor for SWCs to host Joint Seminar. North Kordofan SWCs promoted development of training center facilities prior to the event. Most of the SWC training centers were established by rehabilitating the existing buildings and converting to the facilities with seminar rooms,

			offices for computer lab, water analysis lab, and workshop.
		If there is any negative impact, has the Project dealt with it, and how?	There is no negative effect found as the result of the Project.
SUSTAINABILITY (PROSPECT)	Policies and systems	Will policy support/relevant regulations & legal system continue even after the Project is finished?	If the "Mid-term/long term human resources development plan 2012-2026" is approved by MoHRD, there will be higher possibilities for DWSU to be able to manage budget and regulations essential for training. At the state level, "Water Sanitation and Hygiene (WASH) Sector Strategic Plan (2011-2016)" will remain as the basic policy for SWCs.
		Are the relevant actions prepared to secure human resources development for expansion of the Water Supply System after the completion of the Project?	In line with national and state strategy as indicated in "Relevance" section above, DWSU, DWST and PSWCs have developed plans through the Project based on actual needs for different job category with feasible inputs and timeframe. List of strategy and plan developed by the Project is in Annex 4.
	Institution & Budget	Are there possibilities of handing over of the Project activities to DWSU, DWST, and SWC in terms of personnel allocation, decision making process and facilitation with other bodies?	- <HR>: There are possibilities of handing over the Project activities to DWSU, DWST and PSWCs in terms of personnel allocation for training centers and monitoring & evaluation, decision making process and facilitation with other bodies. Their sense of ownership is high as reflected in the fact that DWST and PSWCs have secured training budget constantly during the Project, and PSWCs have formulated human resources development action plan including training budget for the next 3 years. In case of other states, Northern SWC training center is planning to secure financial sources through generating income by running car maintenance and repairing workshop along with the training center facilities. - <O&M and equipment>: Budget for O&M is generated by sector/locality offices from water tariff revenue in SWCs. However, budget for equipment and spare parts are generally funded by state government to SWCs which is not sufficient to cover all the needs, especially for upgrading the old equipment and machinery. In case of Kssala, SWC has been planning to revise the urban water tariff to generate financial resources for maintenance of water facilities and secure human resources for rural water supply services management. - <Monitoring>: Budget for monitoring activities are generated from training budget in DWSU and from O&M budget at localities in case of PSWCs. However for PSWCs there are shortage in vehicles and equipment for water analysis for monitoring & evaluation unit members to visit water yards.
		After the completion of the Project, will the sense of ownership by DWSU, PSWC, and SWC continue in order to manage the water supply system in Sudan?	
		- Has the budget been secured? - Are there measures to secure future budget?	
	Technology	Will DWST and SWC continuously utilize technology & skills and system (training, monitoring, curriculum revision, equipment maintenance etc.) after completion of the project?	- <Training>: According to DWST, director and course coordinators will continue utilizing technology & skills and system established through the Project period and make revisions accordingly once the new Kilo Ten training center is established in near future. Many of the SWCs established training centers with their own resources during Phase 1 and Phase 2. Thus, SWC staff can utilize training management skills and knowledge in centers as well as at their work in sector/locality offices or SWC headquarters. - <Monitoring>: Since monitoring system has just developed for water yard, DWSU and PSWCs are now facing the challenges to adapt to the new format for monitoring designed for different timing.
		Will the equipment of the Project be maintained appropriately after the end of the Project?	Based on the current management condition as well as trained staff of DWST, PSWCs and other SWCs who participated in training courses (e.g. well management, mechanical/electrical/equipment management, water analysis, pipe network), it is expected that equipment provided by the Project will be managed by C/Ps with appropriate techniques.
		Is dissemination of skills/techniques obtained by the Project secured by DWSU, SWC?	Through Phase 1 and Phase 2 of the Project, DWST became the main center for training human resources in the water supply sector in Sudan. With establishment of new Kilo Ten training center near future, it is expected that DWST will be able to increase their performance in dissemination of advance skills and techniques accumulated in the organization.
	Society and environment	Is there any possibility that consideration will be continuously made for socially vulnerable people in future?	Through community development and sanitation management training courses conducted in PSWCs, consideration has been made on improvement of the livelihood of people in rural communities.
	Hindering factors	Is there any hindering factors for sustainability?	It is essential that security condition of Darfur states, South Kordofan state, West Kordofan state and Blue Nile state get stabilized for sustainability of the impacts.

ANNEX 4: List of materials developed by the Project

<Reports>

1. Human Resources Development Project for Water Supply Phase 2 Work plan (1). November, 2011
2. Human Resources Development Project for Water Supply Phase 2 Project Progress Report (1). April, 2012
3. Human Resources Development Project for Water Supply Phase 2 Project Final Report (1). July, 2012
4. Human Resources Development Project for Water Supply Phase 2 Work plan (2). November, 2012
5. Human Resources Development Project for Water Supply Phase 2 Project Progress Report (2). April, 2013
6. Human Resources Development Project for Water Supply Phase 2 Project Final Report (2). April, 2013
7. Human Resources Development Project for Water Supply Phase 2 Work plan (3). October, 2013
8. Human Resources Development Project for Water Supply Phase 2 Project Progress Report (3). July, 2014
9. Human Resources Development Project for Water Supply Phase 2 Project Final Report (3). July, 2014
10. Human Resources Development Project for Water Supply Phase 2 Work plan (4). November, 2014
11. Human Resources Development Project for Water Supply Phase 2 Project Progress Report (4). April, 2015***
12. Human Resources Development Project for Water Supply Phase 2 Project Final Report (4). October, 2015***

<Strategy & Plan>

1. Mid-term/Long-term Human Resources Development Plan. March 2015*
2. Sennar SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014
3. White Nile SWC Monitoring Plan – Human Resources Development (Training) (2014-2015). November 2014
4. Sennar SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014
5. White Nile SWC Monitoring Plan – Water Supply Facility (Water Yard). November 2014
6. Sennar SWC Monitoring Follow-up and Evaluation Unit Action Plan – Water Yard Rehabilitation (2015-2016). February 2015.
7. White Nile SWC Monitoring and Evaluation Unit Action Plan - Water Yard Rehabilitation (2015-2016). February 2015.
8. Sennar SWC training implementation plan. 2012, 2013, 2014, 2015*
9. White Nile SWC training implementation plan. 2012, 2013, 2014, 2015*
10. Sennar State Water Cooperation Training Center Action Plan (2015-2018) ***
11. White Nile State Water Cooperation Training Center Action Plan (2015-2018)***

<Manuals and Textbooks>

1. DWSU Monitoring Manual - Water Yard. March 2015*
2. DWSU/DWST Monitoring Manual - Human Resources Development (Training). March 2015
3. DWSU Human Resources Development Manual. March 2015***
4. DWST Training Manuals, March 2015***
5. DWST Equipment Management Manual*
6. DWST training course curriculum, textbooks, manual revision. March 2015* [Produced for the following training courses: 1) O&M of water treatment plant, 2) Water supply facility, 3) Data management/GIS, 4) Well management, 5) Organizational management, 6) Water analysis, 7) Pipe network management, 8) Water facility management, 9) Isotope in hydrology, 10) Procurement & storage, 11) Software of pipe network, 12) Hydrometric & surface water, 13) Groundwater geophysics & water well design, 14) Project Cycle Management, 15) Advance well management, 16) Borehole camera, 17) Basic 2D Geo-electrical imaging, 18) Presentation skill, 19) Training of Trainer, 20) Report writing, 21) Planning Monitoring & Evaluation, 22) Well rehabilitation, 23) Engineering economy, 24) Data management/GIS & remote sensing, 25) Solar system, 26) Basic of programmable logic controllers, 27) Supply chain, 28) Estimation costs & equipment management, 29) Computer skills (Excel), 30) Sanitation management, 31) Management skills & Projects planning, 32) Workshop for integrated water resources management & its role for peace-building & conflict resolution, 33) Statistical package for social science (SPSS), 34) Improve rural water supply management, 35) Water analysis (Instrument), (Chromatography techniques) (Chromatography-HPLC) (ISO 17025) (Instrument & Groundwater Treatment), 36) Advanced Procurement & Storage, Management Skills (primavera), 37) Tendering contracts, 39). Human resources development]
7. PSWC training course curriculum, textbooks. March 2015* [Produced for the following training courses: 1) Organizational management, 2) Well management, 3) Water quality management, 4) Data management, 5) Equipment management, 6) Mechanical management, 7) Electric management, 8) Pipe network management, 9) Water treatment plant management, 10) Community development management, 11) Water tariff management, 12) Sanitation management, 13) Computer skills, 14) TCM-Global position system, Government accounting process, Public service act]

<Others (Documents, Database)>

1. Well Rehabilitation Video, March 2014
2. Sudan Water, October 2013**
3. Morocco Training Reports, 2012, 2013, 2014
4. Training database – White Nile SWC
5. Training database – Sennar State SWC
6. White Nile SWC staff database
7. Sennar SWC staff database

* Products are created in Arabic in addition to English version.
** Products are created in Japanese only.
*** Products are draft version as of March 2015 and/or to be completed by the end of the Project in October 2015.

ANNEX 5: Schedule of the Terminal Evaluation

5-1 Schedule of the Japanese Team

Date			Mr.Ejiri (Leader)	Mr.Shimizu (Evaluation Planning)	Ms.Onozato (Evaluation Analysis)
1	20-Feb	Fri			21:20 Narita (EY871) --> 05:10 Abu Dabi
2	21-Feb	Sat			09:55 Abu Dabi --> 13:25 Khartoum (EY632)
3	22-Feb	Sun			08:30 Meeting w/ JICA Sudan Office 10:10-10:25Courtesy call to DWSU DG (JCC Chair/Project director) & DWST Director (Project manager) 10:30-11:40 Interview with DWST Director 12:30-13:30 Group interview with DWSU Monitoring and Evaluation Dept. & Information Center 13:30 Meeting & Interview w/JICA Experts at the Project office 15:00-15:40 North Kordofan SWCT deputy training director
4	23-Feb	Mon			09:00-10:05 Site visit at Water supply facility training at DWST workshop & interview with C/P 10:20-10:50 Group Interview with DWST water analysis C/P 10:50-11:05 Interview with DWST GIS/remote sensing C/P 11:05-11:30 Interview with DWST sanitation management C/P 11:30-11:45 Interview with DWST training database C/P 12:15-12:40 Interview with DWST GIS/remote sensing C/P 13:00-13:40 Interview with DWSU Director General, DWST Director
5	24-Feb	Tue			05:00 Khartoum --> Sennar state 10:30-11:10 Meeting with Sennar SWC Director General 12:15-13:00 Interview with Sennar SWC Training director/ Assistant training director 13:10-14:00 Interview with Sennar SWC Monitoring Follow-up & Evaluation Unit 14:40-14:45 Site visits at water yard in Singa locality 14:50-15:00 Site visits at Singa water treatment plant 15:10-16:00 Singa locality office
6	25-Feb	Wed			08:50-10:20 Site visit at Well management training at Lanorania, Singa sector/ Interview with Sennar SWC Training Center well management, organizational management C/P 10:55-11:20 Interview with Sennar SWC Training Center Database management C/P 11:20-11:45 Interview with Sennar SWC Training Center water quality C/P 12:00-12:15 Interview with Sennar SWC Training Center pipe network C/P 12:15-12:25 Interview with Sennar SWC Training Center mechanical & equipment management C/P 12:25-12:40 Interview with Sennar SWC Training Center water treatment plant C/P 12:45-13:20 Interview with Sennar SWC Training Center community development C/P
7	26-Feb	Thu			09:10-09:25 Interview with Sennar SWC Training Center sanitation management C/P 09:25-09:55 Interview with Sennar SWC Training Director 10:30-11:00 Site visit at Sennar SWC training center workshop Sennar state --> Kosti, White Nile state PM: Compiling collected data & information
8	27-Feb	Fri			Draft of Terminal Evaluation Report
9	28-Feb	Sat			Draft of Terminal Evaluation Report
10	1-Mar	Sun			09:50-10:40 Meeting & interview with WN SWC Training Center DG, Training Center Director, Revenue manager, Project resources managemnt 10:45-11:20 Interview with WN SWC Training Center Monitoring and Evaluation Unit C/P 11:40-12:10 Interview with WN SWC Training Center Electrical management C/P 12:10-12:30 Interview with WN SWC Training Center Mechanical Management C/P 15:10-15:20 Site visits at Water Yard, Tamlika village, Tendalty locality
11	2-Mar	Mon			08:45-09:20 Group interview with WN SWC Training Center Water quality, Database management, Monitoring C/P 09:20-09:45 Group interview with WN SWC Training Center Water treatment plant C/P 09:50-10:35 Group interview with WN SWC Training Center Well management, Water quality management C/P 10:40-11:10 Group interview with WN SWC Training Center Water tariff, Equipment management C/P

					12:05-12:45 Group interview with WN SWC Training Center Organizational management, Pipe network management C/P 12:45-13:20 Group interview with WN SWC Training Center Community development, Sanitation management C/P 13:40-13:50 Kosti water treatment plant
12	3-Mar	Tue			08:45-09:00 Interview with WN SWC training center director 09:10-09:20 Site visit at Electrical management course 09:30-09:40 Site visit at Workshop, WN SWC Kosti, White Nile state --> El Obeid, North Kordofan state 15:25-15:50 Courtesy call to North Kordofan state Ministry of Physical Planning and public utilities and North Kordofan SWC 16:00-17:00 Meeting and interview with North Kordofan SWC
13	4-Mar	Wed			08:30-10:00 Interview with North Kordofan Training Center Director 10:00-11:00 Site visit at training facilities and interview with training center course coordinators 11:00-11:30 Site visit at ElObeid water treatment plant and water analysis laboratory PM: El Obeid, North Kordofan state --> Wad Medani, Gezira
14	5-Mar	Thu			08:40-10:00 Interview with Gezira SWC DG & Training Center Director & Ex-trainee of C/P training in Morocco 10:00-11:30 Site visit at Gezira SWC training facilities and interview with training center staff PM: Wad Medani, Gezira state --> Khartoum
15	6-Mar	Fri			AM&PM: Draft of Terminal Evaluation Report
16	7-Mar	Sat		11:20 Khartoum (QR1329)	AM: Draft of Terminal Evaluation Report PM: Explain about Joint Evaluation Report to Japanese Experts
17	8-Mar	Sun		09:00 Interview with UNICEF 13:30 Interview with UNOPS 15:00 Interview with IOM	
18	9-Mar	Mon	11:20 Khartoum (QR1329)	10:00 Interview with Dam Implementation Unit (DIU), Ministry of Water Resource and Electricity (Water Atlas Project) 10:30 Interview with the hand pump project by Belgian Government 14:00 Site visit at Soba water treatment plant	
19	10-Mar	Tue	10:00 Discussion on Draft Terminal Evaluation Report and M/M with DWSU/DWST/JICA experts 12:30 Explain about Joint Evaluation Report to Project Director Site visit at DWST Kilo Ten		
20	11-Mar	Wed	09:30 Finalizing Joint Evaluation Report 14:30 JCC, Signing of M/M		
21	12-Mar	Thu	09:00 Report to JICA Sudan office 14:00 Report to Embassy of Japan		
			20:55 Departure from Khartoum (QR1328)		14:40 Departure from Khartoum (EY633)
22	13-Mar	Fri	16:55 Arrival in Narita (QR806)		17:35 Arrival in Narita (EY878)

WN: White Nile State

ANNEX 5: Schedule of the Terminal Evaluation
5-2 List of stakeholders consulted

(1) Sudanese side

Drinking Water and Sanitation Unit (DWSU)	
Mr. Mohamed H. M. Ammar	Director General, DWSU
Mr. Omer Elsunnni Takroumi	Information Management, Information center/ Monitoring and Evaluation Department/ Course coordinator for GIS/Remote sensing
Mr. Mohammed Yahya	Computer engineer, Information center/ Monitoring and Evaluation Department
Drinking Water and Sanitation Unit Training Center (DWST)	
Mm. Eatidal El Rayah Malik	Director, DWST
Mr. Egbal B. Alamir	Course coordinator, Training Course 1 (Well management), Department of Training Management
Mr. Bashary Ibrahim	Course coordinator, Training Course 2 (water supply), Department of Training Management
Ms. Rawaa Mohamed Mahdi	Assistant coordinator, Training Course 1 (well management), Department of Training Management
Mr. Abdela Majed Ahmed	Course coordinator, Training Course 3 (water quality), Department of Training Management
Ms. Safia Ali Babekir	Assistant coordinator, Training Course 3 (water quality), Department of Training Management
Mr. Sharaf Aldeen Mahmoud	Assistant coordinator, Training Course 6 (GIS/Remote sensing), Department of Training Management
Mr. Motwkel Mahmoud	Sanitation coordinator, Training Course 7, Department of Training Management
Ms. Hanan Mahmoud	Secretary, Department of Training Management
Sennar State Water Corporation	
Mr. Elmadani Elkhadir Elmadani	Director General, Sennar SWC
Mr. Elsary Kamaleddin	Deputy Director General/ Project Department, Senar SWC
Mr. Abbas Hamid	Director, Training Center
Mr. Galal Bashir Dowelbite	Assistant Director/ Training Course Supervisor/ Training coordinator, Community Development, Water tariff management, Department of Training Management
Mr. Ammar Hassan Rahamtalla Mohammed	Singa Sector Director/ Monitoring Follow-up and Evaluation Unit/Training coordinator, Database management
Mr. Yasir Adam Mohamed	Monitoring Follow-up and Evaluation Unit/Geologist, Shinga Sector
Mr. Awad	O&M, Singa Sector
Ms. Eman Elnour Fad Elmoula	Training coordinator, Water Quality Management/ Monitoring Follow-up and Evaluation Unit/ OMITC
Ms. Monuira	Singa Water Treatment Plant
Mr. Ali Hassan Saad	Lecturer/Training coordinator, Well Management, Organizational management, Department of Training Management
Ms. Omima Mohammed Elhaj	Assistant coordinator, Well Management, Department of Training Management
Ms. Ameera Mohamed Nur	Computer Engineer, Central Sennar Sector/ Training coordinator, Data Management & Monitoring, Department of Training Management
Mr. Humam Abdeen	Training coordinator, Water Quality Management, Department of Training Management
Mr. Ayman Ali	Electrical engineer, Workshop/ Training coordinator, Electric management, Department of Training Management
Mr. Marwa Osman Abd Elhafizz	Central sector/ Training coordinator, Pipe network
Ms. Sara Ali Mohamed	Assistant coordinator, Pipe network/ Planning & Development management
Mr. Zakria Sideeg Mohame	Mechanical engineer, Supply Department/ Training coordinator, Equipment management
Ms. Sana Osman Mohammed	Supervisor, Project of administration/ Assistant coordinator, Water treatment plant
Mr. Abdelbagi Ahmed Alamin	Manager, Pipe network department/ Training coordinator, Water treatment plant
Ms. Rehab Mustafa	Community Development/ Sanitation Management/ Malaria and vector control, Sennar Locality
White Nile State Water Corporation	
Mr. Elsadig M. Tahameed	Director General, White Nile SWC
Mr. Alwahab Awad Abesin	Manager, Revenue
Mr. Mohamemed Yahia	Project resources management
Mr.Ahmed Eltayeb Suliman	Director, Training Center/ Monitoring and Evaluation unit
Ms. Elrisala Mohammed Yousif	Field Geologist, Groundwater unit/ Monitoring and Evaluation unit
Mr. Mohammed Alsadig	Supervisor, Training Course Management
Mr. Faisad M. Aboushoal	Electric Management/ Electrical Engineer, Raback locality office
Mr. El Tayebe Ahmed Adam	Mechanic Management/ Project department
Mm. Rania Babeke Hassan Ali	Course coordinator, Data Management & Monitoring
Ms. Manahil Mahjoub,	Monitoring
Mr. Mohammed Bilal Edris	Assistant course coordinator
Mr. Ahmed Suliman	Course coordinator, Water Treatment Plant/ Project management department
Mr. Adil Eisa Musa	Course coordinator, Water Treatment Plant/ Project management department
Mr. Atif Mohamed	Assistant coordinator, Water quality/ Water quality control, Kosti Locality
Ms. Elresala Mohammed	Course coordinator, Well Management/ Groundwater drilling department
Mr. Ali Abdallah	Assistant coordinator, Well Management/ Groundwater drilling department
Mr. Abdelwahab Abu Sin	Manager, Revenue Department, SWC/ Course coordinator, Water Tariff Management
Mr. Mohamed Ahmed Suliman	Logistics Dept./Course coordinator, Equipment management
Mr. Idreiss Mohamad Idreiss	Distribution network, Kosti Locality/ Course coordinator, Organization Management
Mr. El Smani Elfadel Hag Amer	Manager, Goaly/ Course coordinator, Pipe Network Management

Mr. Awad A. Mahmoud	Head of Personnel, SWC/ Assistant course coordinator, Community Development
Mr. Bilal Abdelrhman,	Assistant course coordinator, Sanitation Management
Mr. Atif Mohamed	Engineer, Water quality, Kosti water treatment plant
Ms. Asma Mohamed Elbager	Laboratory chemist, Kosti water treatment plant
Mr. Omer Mohamed Abbas	Laboratory, Kosti water treatment plant
North Kordofan Ministry of Physical Planning and Public Utilities	
Mr. Hafiz Mohammed Mahmoud Ahmed	North Kordofan state Minister of Physical Planning and public utilities
North Kordofan State Water Corporation	
Mr. Mohammed Ahmed Barrar Sahal	Former DG, North Kordofan SWC
Eng. Anwar Elsadat Elhaj	DG, Water consultancy
Ms. Afra Mustafa Mohammed	Director, North Kordofan State Water Cooperation Training Center
Mr. Iseldi Mohammed Mohammed Ali	Deputy Training Center Director
Mr. Maawia Adam Mohammed Elnoor	Manager of El Obied, Urban Water Supply Directorate
Mr. Ahmed Mohammed Suliman	Chemical engineer, ElObeid Water treatment plant
Ms. Nazik Musa Mohammed	Chemist, ElObeid Water treatment plant
Gezira State Water Corporation	
Mr. Fatherahman Mohmed	Director General,
Mr. Sammi Omer Elamin	Planning & programing Dept. manager
Mr. Mohammed Alawad	Installation civil engineering manager
Mr. Isameldeen Munsor	Project Department,
Mr. Abdalla Mohammed	Technical office manager
Ms. Batoul Saad Faggad	Training center director
Mr. Ehab Abdallal	Computer engineer, Training center
Mr. Arwa Abulehassa Makeen	Computer engineer, Training center
Other SWCs (Note: Following stakeholders were consulted through questionnaire only.)	
Mr. Mhmoud Abdalla Gamaa	Director General, West Darfur SWC
Mr. Nasrelden Mohamoad Mohamed	Director General/Training Director, North Darfur SWC
Mr. Idris Dabaka Adam	Director General, South Darfur SWC
Mr. Ibrahim Abaker Digies	Director General, Central Darfur SWC
Mr. Abdelrhman Mohamed Ahmed	Director General/Training Director, Blue Nile SWC
Mr. Hashim Mohamed Abdo Alateef	Director General/Training Director, Kassala SWC
Mr. E.Abubaker Abdalla Mohammed	Director General, River Nile SWC
Mr. E.Nazar Mustafa Abbas Ahmed	Training Director, River Nile SWC
Mr. Abdalla Mohammed Mahmoud	Training Director, Northern SWC
Mr. Hashim Mohamed Abdo Alateef	Director General, Kassala SWC
Mr. Mustafa Ibrahim Mustafa	Director General, Gadaref SWC
Dam Implementation Unit, Federal Ministry of Water Resources and Electricity	
Mr. Bahaeldin Mohamed Mahmoud	Head of survey & ground imaging department
Mr. Hatim Elobied Ibrahim	GIS specialist, GIS centert

(2) Development partners

UNICEF	
Mr. Fouad Yassa	WASH specialist, Water and Environmental Sanitation (WASH) section
UNOPS	
Ms. Kazuyo Mitsuhashi	Project coordinator
IOM	
Mr. Tatsuaki Tomiyama	Deputy Programme Coordinator, WASH and Basic Infrastructure Unit
Mr. Shintaro Higashiyama	Project Intern, Social Cohesion Unit
Honorary Consulate of Belgium in Khartoum	
Mr. Rushdi Hamid	Honorary Consul

(3) Japanese side

JICA Sudan Office	
Mr. Akihira Sano	Project Formulation Advisor
JICA experts	
Mr. Mitsuro Uemura	Leader/Training Plan/Water Supply Plan 1
Mr. Jun Onodera	Deputy Project Leader/Organizational Management/Water Tariff Management
Mr. Yusuke Oshika	Well Management
Mr. Ryoichi Kimura	Electricity/Mechanics/Equipment Management
Mr. Tadashi Sato	Data Management/Monitoring
Mr. Arata Sasaki	Community Development
Ms. Aya Kadokami	Sanitation Management
Project national staff	
Mr. Abdelgader Babiker	
Mr. Ahmmed Abdalla	

付属資料２：活動実績表

<table>
<tr><th>計画</th><th>実績</th></tr>
<tr><td colspan="2">成果１：DWST で中長期人材育成計画に則った研修が実施される</td></tr>
<tr><td>1-1 DWST が中長期人材育成計画(案)を策定する。</td><td>・「四半世紀給水戦略 2011-2031 年」を踏まえ、DWST は「中長期人材育成計画（案)」の骨格を策定し、2012 年 6 月 27 日第 2 回 JCC にて承認を受けた。同計画内容の原則は新規研修センターのキロテン地区での建設であり、付加価値の高い人材育成の促進を目的とした、コンピュータ及び外国語スキルの取得を目指す活動計画が立案された（2014 年 11 月)。
・DWST を初めとするスーダン側の各機関関係者と JICA 専門家は協議を重ね、DWSU、DWST、PSWC にアンケート調査を実施し、その結果を踏まえ、以下の内容を計画に反映した。
【中期計画（2012-2018 年)】5 つの能力の向上を目標とし（コンピュータ能力、データ処理・分析能力、報告書作成能力、プレゼンテーション能力、英語)、以下の主要活動から構成されている（①キロテン地区の新規研修センター建設、②DWST の効率的な組織及び管理システムの構築、③各 SWC における研修ユニットの設置、④各 SWC における確実な研修システムの構築、⑤研修モニタリングシステムの構築、⑥各 SWC 研修センター長との定期的な会議の開催、⑦PWCT における情報センターの設置、⑧全ての SWC におけるスタッフのデータベース構築、⑨コンピュータによる管理システムの構築、⑩オリジナルウェブサイト（各 SWC と PWCT）の構築、⑪太陽光等の先端技術の導入と設置）
【長期計画（2012-2026 年)】7 つの能力の向上を目標とし（組織管理能力、調査設計能力、プロジェクト管理能力、施設管理能力、機材管理能力、品質管理能力、モニタリング評価能力)、以下の 5 つの活動から構成されている（①モロッコとの技術交換事業の実施、②国際基準を満たした PWCT 研修センターの設置、③アフリカの中核となる研修センター、④施設や機材が完璧に整備された研修センター、⑤民間企業を含めた研修の実施）
・DWST は国家人材育成省との協議を重ね、同省の国家人材育成戦略に沿った内容を「中長期人材育成計画（案)」の総論とし、最終化の作業を進めた。</td></tr>
<tr><td>1-2 DWST が SWC の研修ニーズを把握し、優先順位を付ける。</td><td>・1 年次に 10 州（北部州、ゲジラ州、ゲダレフ州、カッサラ州、ナイル州、センナール州、白ナイル州、北コルドファン州、北ダルフール州、西ダルフール州）を訪問し、各種研修ニーズの調査を実施し、給水分野の業務サイクルの各ステージに分類した、研修ニーズと優先度が特定された。(優先度　A:高い、B:中程度)
<table>
<tr><th>No.</th><th>ステージ</th><th>ソフト分野研修</th><th>優先度</th><th>ハード分野研修</th><th>優先度</th></tr>
<tr><td>1</td><td>調査設計</td><td>設計・積算</td><td>B</td><td>物理探査</td><td>A</td></tr>
<tr><td></td><td></td><td>コンピュータの基礎</td><td>A</td><td>事前調査</td><td>B</td></tr>
<tr><td></td><td></td><td>報告書作成</td><td>A</td><td>浄水場設計</td><td>B</td></tr>
<tr><td></td><td></td><td>調査のプレゼンテーション</td><td>A</td><td>ウォーターヤード設計</td><td>A</td></tr>
<tr><td></td><td></td><td>データ収集/GIS</td><td>A</td><td>配管設計</td><td>A</td></tr>
<tr><td></td><td></td><td>PCM</td><td>A</td><td>電気・機械</td><td>A</td></tr>
<tr><td>2</td><td>機材調達・施工</td><td>機材調達</td><td>B</td><td>井戸掘削と施工管理</td><td>A</td></tr>
<tr><td></td><td></td><td>機材検収</td><td>B</td><td>浄水場施工管理</td><td>B</td></tr>
<tr><td></td><td></td><td>機材管理</td><td>A</td><td>ウォーターヤードの施工管理</td><td>A</td></tr>
<tr><td></td><td></td><td>施工計画書の作成</td><td>A</td><td>ポンプ・発電機</td><td>A</td></tr>
<tr><td></td><td></td><td>施工契約</td><td>B</td><td>配管工事の施工管理</td><td>A</td></tr>
<tr><td>3</td><td>運営・維持管理</td><td>組織管理</td><td>A</td><td>井戸管理</td><td>A</td></tr>
<tr><td></td><td></td><td>料金徴収</td><td>A</td><td>浄水場維持管理</td><td>A</td></tr>
<tr><td></td><td></td><td>村落啓発</td><td>A</td><td>給水施設維持管理</td><td>A</td></tr>
<tr><td></td><td></td><td>データベース/GIS</td><td>A</td><td>水質管理</td><td>A</td></tr>
<tr><td></td><td></td><td>マニュアル作成</td><td>A</td><td>管網管理</td><td>A</td></tr>
<tr><td></td><td></td><td>水政策</td><td>A</td><td>ワークショップ管理</td><td>A</td></tr>
<tr><td>4</td><td>評価</td><td>モニタリング方法</td><td>A</td><td>施設のモニタリング</td><td>A</td></tr>
<tr><td></td><td></td><td>モニタリング報告書の作成</td><td>B</td><td>機材のモニタリング</td><td>A</td></tr>
<tr><td></td><td></td><td>評価のプレゼンテーション</td><td>B</td><td>管理方法のモニタリング</td><td>A</td></tr>
<tr><td>5</td><td>改修・改善・拡張</td><td>改修計画書の作成</td><td>A</td><td>井戸の改修</td><td>A</td></tr>
<tr><td></td><td></td><td>改修工事の設計積算</td><td>A</td><td>ウォーターヤードの改修・拡張</td><td>A</td></tr>
<tr><td></td><td></td><td>改修工事の機材調達</td><td>A</td><td>浄水場の改修・改善</td><td>A</td></tr>
<tr><td>6</td><td>その他</td><td>英語の基礎</td><td>A</td><td>ウォーターハーベスティング</td><td>B</td></tr>
<tr><td></td><td></td><td>資金管理</td><td>B</td><td>海水淡水化</td><td>B</td></tr>
</table>
出所：業務完了報告書第 1 号 2012 年 7 月、P11</td></tr>
</table>

スーダン水供給人材育成プロジェクト・フェーズ 2　活動実績表

1-3 DWST が中長期人材育成計画(案)に則り優先順位を反映した研修実施計画を策定する

・DWST は中長期人材育成計画（案）の骨子に基づき、研修デザインと計画を更新している。

・フェーズ 2 開始（2011 年 11 月）までに DWST が実施していた 13 の研修コースは以下の通り。

1.浄水場維持管理、2. 給水施設、3. データ管理/GIS、4. 井戸管理、5. 組織管理、6. 水質管理、7. 配管網管理、8. 給水施設管理、9. アイソトープ水文学、10. 調達・保管、11. 配管網ソフトウェア、12. 流量測定と表流水、13. 地下水資源と井戸設計

・フェーズ 2 開始後、DWST は以下の研修コースを開発した。

1. プロジェクトサイクルマネージメント、2. 井戸管理上級、3. 井戸カメラ、4. 物理探査基礎（2D Geo-electrical imaging)、5. プレゼンスキル、6. 指導員研修、7. 報告書作成、8. モニタリング評価計画、9. 井戸改修、10. エンジニアリング・エコノミー、11. データマネージメント/GIS リモートセンシング、12. 太陽光システム、13. 基礎 PLC、14. サプライチェーン、15. コスト推計・機材管理、16. PC スキル（エクセル)、17. 衛生管理、18. マネージメントスキル・プロジェクト計画、19. 統合水資源管理・平和構築・紛争解決ワークショップ、20. 統計分析（SPSS)、21. 地方給水管理改善、22. 水質分析（Instrument）(Chromatography techniques)（Chromatography-HPLC）(ISO 17025)（Instrument & Groundwater Treatment)、23. 上級調達・保管、マネージメント（primavera)、24. 入札・契約管理、25. 人材育成

・2012 年 8 月、PWC が DWSU に名称を変更し、衛生管理分野の要素も網羅することが不可欠となったことから、2014 年 1 月から同研修コースも追加され、研修コーディネーターも配置された。DWST は 1 回目の研修に加え、自助努力により 2 回目の同研修を計画、実施した。

1-4 DWST が研修実施計画に沿って、研修を実施する。

・2014 年 12 月時点で DWST の研修参加延べ人数は 1,629 名に達した（フェーズ 1 からフェーズ 2 期間に実施された様々な研修コース計 107 回を通じ)。2015 年には DWST は 16 研修コース計 25 回が予定されている。

・これまで 30 機関からの参加があった。州 SWC からの研修生は全体の約 80%を超えている。2013 年 9 月からは、ダルフール及び南コルドファン州で事業を実施している UNOPS、IOM、アフリカ開発銀行が同地域からの研修生を DWST に派遣するようになった。これにより給水分野の人材育成に係る援助協調が促進された。

No	DWST 研修コース	参加者数　（年度別）							
		2009	2010	2011	2012	2013	2014	2015	合計
1	浄水場維持管理	41	17	15	29(14+15)	0	29(11+10+8)		131
2	給水施設	64(22+20+22)	18	31(16+15)	29(14+15)	52(17+19+16)	16	16	226
3	データ管理/GIS	46(16+15+15)	27(14+13)	16	26(13+13)	31(17+14)	0	13	159
5	井戸管理	19	37(19+18)	17	16	0	44(18+14+12)		133
6	組織管理	12	25(12+13)	0	0	13	16		66
4	水質管理	0	33(17+16)	32(16+16)	29(14+15)	29(15+24)	26(15+11)	14	163
7	配管網管理	0	35(18+17)	30(11+19)	26(13+13)	54(13+13+16+12)	48(17+16+15)		193
8	給水施設管理*	0	39(15+9+11+4)	0	0	0	0		39
9	上級井戸管理*	0	0	0	9	0	0		9
10	井戸カメラ*	0	0	0	8	0	0		8
11	コスト推計・機材管理*	0	0	0	0	9	0		9
12	アイソトープ水文学	0	0	8	0	0	0		8
13	調達・保管/サプライチェーン			13	19	10	10		52
14	井戸設計			16	16	49(13+11+9+16)			81
15	流量測定と表流水			25	0	0			25
16	プロジェクトサイクルマネージメント			16	15	0			31
17	物理探査*				26(12+14)*	0			26
18	プレゼンスキル				15	0			15
19	指導員研修				13	0			13
20	報告書作成				11	11			22
21	モニタリング評価計画					18			18
22	井戸改修の経済効果					12			12
23	エンジニアリングエコノミー					14			14

24	太陽光システム					24(9+15)			24
25	地下水処理・クロマトグラフィー技術					25(15+10)	27(13+14)		52
26	PLC 基礎					17			17
27	PC スキル（エクセル）					12			12
28	衛生管理						34(19+15)		34
29	マネージメントスキル・プロジェクト計画						26(14+12)		26
30	統合水資源管理・平和構築・紛争解決ワークショップ						25		25
31	統計分析（SPSS）						11		11
32	ウォーターヤード技術管理	0	0	0	0	0	18		18
33	地下水・表流水アトラスワークショップ							73	73
34	地方給水開発							14	14
35	年金と保険							16	
	合計	182	231	219	287	380	330	146	1,775

・モロッコ第三国研修を 3 回に渡って実施し、延べ 38 名の DWSU、DWST、SWC からの研修生が給水施設管理の現場視察と専門技術に関する知識を習得した。帰国後、研修生は DWST で開催された報告会で研修成果の発表を行った。スーダンの水分野における問題点を対外的な観点から比較検討することで、意識改革、自助努力が促進された。具体的には、センナール州の帰国研修生が、帰国後、同研修を通じ得た経験が刺激となり、同州、給水分野の中長期人材育成計画を策定するなど研修の効果が確認されている。2015 年 3-4 月には第 4 回目の研修を計画し、約 14 名の派遣を予定している。

	期間	テーマ	参加者	報告会
0	2012.03.18-03.29	・モロッコ都市部、地方部の水資源開発と飲料水供給、節水灌漑、下水再処理計画の視察 ・スーダン人研修生受入予定機関（モロッコ国営水道公社（ONEE)、水利庁、テンシフト流域水利公社、地方整備局、スース・マッサー・ダラー流域水利公社）との事前協議	・DWST1 名、日本人専門家 1 名同行	2012.3.29
1	2012.05.13-05.27 （14 日間）	・モロッコの先進的な研修施設、研修実施体制、水資源開発及び水源保護、都市給水システム、村落給水システム、下水処理と下水再利用及び節水灌漑等の視察、モロッコ側関係者との意見交換 ・何故モロッコがアフリカで最も先進的な水資源開発や人材育成及び飲料水供給を実施できたのかその背景考える	計 16 名（対象：州水公社のエンジニアクラス） DWST：1 名、センナール州：2 名、白ナイル州：2 名、カッサラ州：3 名**、ダルフール 3 州：3 名*、南コルドファン州:1 名*、青ナイル州：1 名* 同行者：コーディネーター1 名、日本人専門家 2 名	2012.6.20
2	2013.04.06-04.14 （9 日間）	・モロッコ国営水道公社、水利庁、テンシフト流域水利公社、地方整備局における講義と視察 ・フェズ浄水・給水施設視察 ・研修管理全体	計 17 名（対象：各州水公社の研修センター長、エンジニアクラス） DWST：1 名、北部州：1 名、ナイル州：1 名、ハルツーム州:1 名、エル・ゲジーラ州：1 名、センナール州：1 名、白ナイル州：1 名、北コルドファン州:1 名*、北ダルフール州：1 名*、西ダルフール州：1 名*、南ダルフール州：1 名*、南コルドファン州:1 名* 同行者：日本人専門家 2 名、JICA スーダン事務所 1 名	2013.4.29
3	2014.04.05-04.13 （9 日間）	・モロッコの村落給水、料金徴収方法、水道メーターの設置、施設や機材の運営維持管理方法等 ・下水処理水の有効利用や節水灌漑	計 12 名 DWST：1 名、センナール州：1 名、白ナイル州：1 名、カッサラ州：2 名、紅海州：1 名、ナイル州：1 名、北部州：1 名、ゲダレフ州：1 名 同行者：コーディネーター：1 名、日本人専門家 1 名	2014.5.14
4	2015.3-4 月頃予定 （9 日間）	・ONEE の浄水場を対象とした施設や機材の運営維持管理方法 ・今後のモロッコとスーダンの人材育成に関する具体的なアプローチを協議	計 13 名（予定） DWST：1 名、センナール州：1 名、白ナイル州：3 名、カッサラ州:1 名、北部州：1 名、ナイル州：1 名、ハルツーム州：1 名、ゲダレフ州：1 名、エル・ゲジーラ州：1 名 同行者：コーディネーター：1 名、日本人専門家 1 名	-

スーダン水供給人材育成プロジェクト・フェーズ 2　活動実績表

<table>
<tr><td></td><td>*「ダルフール及び暫定統治三地域人材育成プロジェクト」参加者、**「カッサラ州基本行政サービス向上による復興支援プロジェクト」参加者
・モロッコとスーダンの継続的な南南協力を開始するにあたって、2012 年よりモロッコ人専門家を招聘している。詳細は同専門家による報告書（英文）に取り纏められている。今後のモロッコとスーダンの人材育成に関する具体的なアプローチについては、4 年次に計画されているモロッコ研修期間中、スーダン側の人材育成にかかるビジョンを含め、更に詳細を協議する予定。
<table>
<tr><th></th><th>期間</th><th>テーマ</th><th>参加者</th></tr>
<tr><td>1</td><td>2012.12.08-12.16
（9 日間）</td><td>・PWCT の研修体制や研修内容に対する視察と改善点のコメント、州水公社で実施されている研修に対する専門的な視点でのアドバイス等
・訪問、視察先：水資源・電力省、DWSU、DWST、PSWC、カッサラ州 SWC、エル・ゲジーラ州 SWC</td><td>ONEE の研修担当者 5 名</td></tr>
<tr><td>2</td><td>2013.12.13-12.27
（9 日間）</td><td>・DWSU、DWST 協議
・白ナイル州ダム、センナール州ダム、ゲジラ州水質研究所、浄水場、キロテン研修センター、ソバ浄水場視察
・DWSU、DWST、各州 SWC 職員へのプレゼン（モロッコの様々な水利用、水資源開発等）
・「国際海水淡水化セミナー」開催、紅海州海水淡水化施設調査</td><td>計 4 名
ONEE：3 名、エネルギー・鉱山・水・環境省：1 名、流域水利公社：1 名</td></tr>
<tr><td>3</td><td>2014.12.13-12.18
（6 日間）</td><td>・今後のモロッコとスーダンの人材育成に関する具体的なアプローチを協議</td><td>計 2 名
①ONEE 国際水衛生局局長
②水環境資源省ブーレグレグ流域水利公社総裁</td></tr>
</table>
</td></tr>
<tr><td>1-5 DWST が研修の評価を行う。</td><td>・DWST はフェーズ 1 で開発された各種評価手法に基づき、3 項目（①研修のコース、②講師、③施設）について研修生による 5 段階評価を実施し、研修報告書にまとめている。
・DWST はフェーズ 1 からの取組みとして、研修生による研修知識・技術の習得レベルを測るため、理解度試験を実施し、成績優秀者については表彰状を授与している。
・モロッコでの第三国研修について、第 1 回目の研修生ほぼ全員は非常に満足していると評価している。第 2 回目、第 3 回目の参加者は全員が非常に満足しているという結果が出ている。</td></tr>
<tr><td>1-6 DWST が評価結果を基に既存の研修コースカリキュラム、テキスト、マニュアルの改訂を行う。</td><td>・DWST は JICA 専門家技術支援の下、研修コース増加に伴い、フェーズ 1 で作成したカリキュラムの変更、新規コースのテキストの作成を毎年実施し、「研修データベース」で管理している。新規研修センターの建設が完了し、開設された際の、カリキュラム、テキスト、マニュアル作成の課題は残されている。
・これまでに DWST は研修実施に関する各種マニュアルを作成した。（「付属資料 1.　協議議事録　ANNEX 4」参照）</td></tr>
<tr><td>1-7 DWST が研修センターの拡大に応じて研修キャパシティを強化する。</td><td>・イランからの有償資金協力が 2011 年 10 月に締結され、新規研修センターの建設が開始される予定であったが、遅延が発生していることから、同研修センター完成に合わせた新たな研修実施体制の再構築ができていない。しかし、DWST では同センターが開設されることを前提に、フェーズ 1 から中心的な役割を果たしている人材のリーダーシップの下、現行の人員で既存の施設機材を活用し、研修を実施している。
・DWST は毎年研修生受入数を増加している（2011 年 219 名、2012 年 287 名、2013 年 380 名、2014 年 330 名）。
・DWST の研修予算についても増加している（2011 年 1,208,900SDG、2012 年 1,353,700SDG、2013 年 2,462,700SDG、2014 年 2,906,200SDG）。</td></tr>
<tr><td>1-8 DWST が中長期人材育成計画を策定し、国家の承認を得るよう働きかける。</td><td>・活動 1-1 のとおり、DWST は国家人材育成省との協議を重ね、最終化作業を進めた。本調査時点で DWSU の承認を受けた最終版は MoWRE 大臣へ提出され承認まちである。その後、MoHRD が最終的に承認することで、認定書が発行される予定である。</td></tr>
</table>

成果 2：DWST による支援の下、PSWC における研修実施体制が確立される

2-1 DWST は以下の PSWC の取り組みへの支援を通じ指導力を強化する。	・DWST センター長をはじめとするスタッフが、定期的な巡回指導、日々の PSWC 研修コーディネーターからの問合せ対応を通じ、州レベルの研修支援を実施している。JICA 専門家が常駐している、パイロット州の白ナイル州とセンナール州では、DWST チーフコーディネーターが主体的に、研修計画の立案、研修の実施方法と各種評価及び研修センターの運営維持管理について、定期的、日常的な指導を行っている。 ・中央及び州レベルの Director General の定例会が開催されており、関係者間の情報共有、DWST から SWC への技術アドバイスの機会となっている。
2-2 PSWC が研修ユニットを設置する。	・2011 年 11 月に白ナイル州 SWC は研修センターを設立した。2012 年 4 月にセンナール州 SWC は研修センターを設立した。 ・パイロット州では第 3 年次までにほぼ全員が兼務であるものの、研修センターの活動を行う人員が配置された。
2-3 PSWC は、州事業実施計画（案）を策定する。	・4 年次には各 PWC において、今後 3 年間（2015－2017 年）にわたる研修実施計画を含む「アクションプラン」作りに取り組んでいる。 ・毎年パイロット州では、研修予算が確保されている。(「付属資料 1.　協議議事録　ANNEX 2: Inputs to the Project, 2-6 Local cost from Sudanese side 参照)
2-4 PSWC が研修ニーズを把握し、優先順位を付ける。	・第 1 年次にパイロット州（白ナイル州、センナール州）における研修ニーズ、優先順位の高い「A」項目を以下の通り特定した。

No.	ステージ	ソフト分野研修	優先度	ハード分野研修	優先度
1	調査設計	コンピュータの基礎	A	物理探査	A
		報告書作成	A	電気・機械	A
		調査のプレゼンテーション	A		
		データ収集/GIS	A		
2	機材調達・施工	機材調達	A	ポンプ・発電機	A
		機材検収	A	配管工事の施工管理	A
		機材管理	A		
3	運営・維持管理	組織管理	A	井戸管理	A
		料金徴収	A	浄水場維持管理	A
		コミュニティ啓発	A	給水施設維持管理	A
		データベース/GIS	A	水質管理	A
		マニュアル作成	A	管網管理	A
		水政策	A	ワークショップ管理	A
4	評価	モニタリング方法	A	施設のモニタリング	A
				機材のモニタリング	A
				管理方法のモニタリング	A
5	改修・改善・拡張			井戸の改修	A
				ウォーターヤードの改修・拡張	A
6	その他	資金管理	A		

2-5 PSWC が優先順位を踏まえた研修実施計画を策定する。	・1 年次には、パイロット 2 州における研修計画を専門家が提案し、2 コース（①井戸管理、②組織管理）を実施した。 ・2 年次には、スーダン側が独自で実施できるコンピュータ基礎の他、専門家が技術指導を行うコース（①組織管理、②井戸管理、③水質管理、④データ管理、⑤機材管理、⑥機械管理、⑦電気管理、⑧管網管理、⑨浄水場管理、⑩コミュニティ啓発）が計画された。研修期間はいずれも 3 日から 19 日と内容に応じて調整している。 ・3 年次には、水道料金管理コースが追加された。 ・4 年次には、衛生管理コースが追加された。また、JICA 専門家によるコスティ特別研修（機械管理、機材管理、電気管理）を計画し、日本政府による無償資金協力「コスティ給水施設改善計画」の C/P に対し、ソフトコンポーネントを補完する技術研修を実施。

2-6 PSWCの研修ユニットが研修コースカリキュラム（実地研修を含む）とテキストを開発する。

・1年次、PSWCはフェーズ1のプロジェクト期間中にDWSTで作成された既存のテキスト、カリキュラム資料を活用し（研修データベース）、アラビア語翻訳で対応した。
・2年次以降は、PSWCはJICA専門家の支援の下、PSWC研修管理スタッフと大学等の講師間の協議を重ね、研修コースのカリキュラム作成、テキストの作成を実施した。DWSTからもスタッフが派遣され、DWSTで蓄積されたノウハウを活かしたカリキュラム開発とテキスト開発が毎年実施されている。
・井戸管理、機械管理、電気管理、機材管理、コミュニティ開発、衛生管理は研修センターでの講義の他、OJT手法を用いた実習が行われている。データ管理等のコースも研修参加者の実務に基づいた内容の講習が行われている。

2-7 PSWCの研修ユニットが研修を実施する。

・白ナイル州、センナール州のPSWCが実施した研修コース、PSWCの研修コーディネーターの貢献度、研修参加者数は以下の通り。両州合わせた研修生数は延べ941名に上る（2015年3月5日時点）。
・白ナイル州の参加者数は延べ523名であり(2015年3月5日時点)、研修コーディネーターの貢献度（年平均値）は年々上昇しており（2012年から2013年への伸び率36%、2013年から2014年の伸び率は9%)、2013年平均で見ると目標値80%に達成している。2014年にはコスティで実施される無償資金協力プロジェクトのカウンターパートを対象とし、ソフト面での補完支援を目的としたコスティ特別研修（電気・機械・機材管理）が計画、実施されている（参加者延べ25名）。

コース名	白ナイル州SWC研修センター								
	2012		2013		2014		2015		合計
	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）
組織管理	20 (10+10)	62.1, 63.6	19	87.9	-	-	28	86.7	39
井戸管理	11	60.0	14	63.0	12	86.7	12	-	37
水質管理	10	66.0	-	-	47 (21+26)	84.0, 94.0	-	-	57
データ管理	10	61.7	14	87.2	-	-	-	-	24
機材管理	13	65.0	14	86.1	-	-	-	-	27
機械管理	11	67.0	-	-	50 (11+14+25)	81.0, 95.7, 86.1	-	-	61
電気管理	7	73.2	-	-	13	90.6	6	-	26
配管網管理	-	-	17 (9+8)	86.0, 67.0	14	94.0	-	-	31
浄水場管理	-	-	13	82.6	50 (24+26)	86.3, 94.3	-	-	63
コミュニティ開発	-	-	17	82.6	17	85.0	12	94.6	46
水道料金管理	-	-	25	84.0	-	-	28	86.7	25
衛生管理	-	-	-	-	19	91.0	-	-	19
研修生数合計/平均貢献度率	82	64.8	133	80.7	222	89.1	86	89.3	523

出所：白ナイル州SWCデータベース

・センナール州の参加者数は延べ418名であり（2015年3月5日末時点)、研修コーディネーターの貢献度（年平均値）は年々上昇しており、2013年には80%以上に到達した（2012年から2013年伸び率21%、2013年から2014年伸び率8%)。また、独自で11コースを実施している（貢献度100%と記載されているコース）
・2年次は他州であるゲジラ州からも参加があった。白ナイル州では研修センターがコスティ浄水場に隣接しており浄水場維持管理コースは人気が高く、研修生以外の聴講者の参加もあった。井戸管理研修にはカッサラ州PWC職員が講師として招聘されるなど人事交流も実施された。
・センナール州では、同州PWCエンジニア9名に加え、ダルフール3州のエンジニア8名の研修生を対象とした井戸管理研修をJICA専門家が講師となり実施した（2013年3月10-14日)。同コースではドイツの支援によりゲジラ州のハワタプロジェクトを視察し、ウォーターヤードの遠隔操作によるオペレーション、改修機材のスペアパーツの管理、停電などの緊急時のスタンバイシステムの採用、水道メーターによる料金徴収と独立採算制度を採用している同システムについて学ぶ機会となった。

コース名	センナール州 SWC 研修センター								
	2012		2013		2014		2015		合計
	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）	貢献度（%）	研修生（人）
組織管理	32 (10+15+7)	59.0, 100, 53.0	24 (14+10)	N/A, 76.9	–	–	–	–	56
井戸管理	11	65.0	20 (11+9)	64.1, 91.1	–	–	8	95.90	39
水質管理	5	67.0	–	–	19 (10+9)	82.0, 94.3	–	–	24
データ管理	10	71.8	9	87.8	–	–	–	–	19
機材管理	10	61.0	7	81.4	7	81.4			24
機械管理	–	–	11	78.0	18 (9+9)	87.5, 87.5			29
電気管理	–	–	16 (7+9)	86.0, 100	7	92.4	–		23
配管網管理	–	–	17 (9+8)	67.0, 83.5	5	94.0			22
浄水場管理	–	–	12	81.1	19 (9+10)	87.1, 92.3			31
コミュニティ開発	–	–	15	78.7	12	86.3	11	94.7	38
水道料金管理	–	–	12	87.0	–	–	–	–	12
衛生管理	–	–	–	–	9	92.0			9
コンピュータ基礎	24 (13+11)	100, 100	–	–	–	–			24
オート CAD	–	–	10	100.0	–	–			10
会計・エクセル	–	–	10	–	–	–			10
政府補助金システム	–	–	11	100.0	–	–			11
政府会計プロセス	–	–	–	–	11	100			11
公共サービス条例	–	–	–	–	12	100			12
GPS	–	–	–		14	100			14
研修生数合計/平均貢献度率	92	69.31	174	84.1	133	91.2	19	95.3	418

出所：“Sennar State Water Corporation training monitoring, 4 February 2015”、JICA 専門家提供データ

2-8 PSWC の研修ユニットが研修の評価を行う。

・白ナイル州で実施された研修コースの研修生による評価結果（満足度）は以下の通り。

コース名	白ナイル州 SWC 研修センター											
	2012 年			2013 年			2014 年			2015 年		
	コース	講師	環境	コース	講師	環境	コース	講師	環境	コース	講師	環境
組織管理	87.0 89.7	98.0 92.6	89.7 89.7	97.4	94.1	92.9	–	–	–	98.6	97.2	86.7
井戸管理	65.4	66.0	76.2	76.4	52.0	60.1	92.9	89.8	85.0	N/A	N/A-	55.0
水質管理	80.6	82.2	82.9	–	–	–	91.3	84.1	86.2	–	–	–
データ管理	96.2	95.9	92.9	99.1	88.2	93.6	–	–	–	–	–	–
機材管理	98.8	98.2	95.5	92.5	95.1	89.2	99.1	98.85	98.3	–	–	–
機械管理	93.8	92.0	88.7	–	–	–	93.2 93.2	92.6 96.3	90.9 92.4	–	–	–
電気管理	89.1	91.7	92.2	–	–	–	89.2	91.7	91.8	N/A	N/A	N/A
配管網管理	–	–	–	91.1 90.1	88.3 87.2	89.0 89.8	90.4	90.3	89.7	–	–	–
浄水場管理	–	–	–	93.9	92.4	90.6	93.8 93.5	89.6 93.77	88.7 94.1	–	–	–
コミュニティ開発	–	–	–	94.5	96.3	96.0	94.1	95.3	94.1	76.0	95.1	84.2
水道料金管理	–	–	–	93.9	92.4	90.6	–	–	–	98.6	97.2	86.7
衛生管理	–	–	–	–	–	–	85.5	89.9	87.7	–	–	–
平均値（%）	87.6	89.6	88.5	92.1	87.3	88.0	92.4	92.0	90.8	94.4	96.5	78.15

出所：白ナイル州 SWC データベース

・センナール州で実施された研修コースの研修生による評価結果（満足度）は以下の通り。

コース名	センナール州 SWC 研修センター											
	2012 年			2013 年			2014 年			2015 年		
	コース	講師	環境	コース	講師	環境	コース	講師	環境	コース	講師	環境
組織管理	97.0 98.4	95.5 98.0	80.1 93.0	98.3	96.7	92.9				－	－	－
井戸管理	92.1	92.5	－	82.6 96.8	86.4 94.7	93.3 94.6				99.1	98.5	98.5
水質管理	94.8	89.8	91.8				95.0 93.9	95.7 95.2	83.5 92.6	－	－	－
データ管理	94.8	93.9	88.8	95.5	98.0	90.8				－	－	－
機材管理	96.4	95.8	80.0	96.7	97.0	93.0	99.1	98.8	98.3			
機械管理	－	－	－	96.3	93.4	84.0	98.1 98.1	97.4 97.7	87.0 87.0	－	－	－
電気管理	－	－	－	82.2	92.2	76.5	98.8	98.8	82.4	－	－	－
配管網管理	－	－	－	91.1 95.8	88.3 94.3	89.0 89.0	100	97.88	89.0			
浄水場管理	－	－	－	94.7	93.7	92.6	95.0 93.2	93.8 87.9	91.0 78.7			
コミュニティ開発	－	－	－	96.6	94.5	92.8	96.2	96.7	91.0	98.2	98.5	88.9
水道料金管理	－	－	－	97.1	98.2	93.0				－	－	－
衛生管理							97.6	96.6	96.7			
コンピュータ基礎												
オート CAD				97.7	97.1	95.4						
会計・エクセル												
政府補助金システム												
政府会計プロセス							97.2	97.2	92.5			
公共サービス条例							98.3	96.0	94.5			
GPS							93.6	90.4	92.4			
平均値 (%)	95.6	94.25	86.74	94.0	94.2	90.5	96.7	95.7	89.8	98.7	98.5	93.7

出所：“Sennar State Water Corporation training monitoring, 4 February 2015”、JICA 専門家提供データ

2-9 PSWC の研修ユニットが研修評価結果をもとに、研修コースカリキュラムとテキストの改訂を行う。	・PSWC の研修コーディネーターはカリキュラム、教材等を研修生によるコース評価結果や JICA 専門家による技術アドバイスに基づき改訂している。 ・2 年次に実施した研修参加者からは研修期間の不足が多く挙げられた。PSWT では専門家の派遣期間が制約されていることと、セミナールーム及びコンピュータルームがそれぞれ 1 室しかないため、複数の研修の同時開催は不可能であったことから、1 週間の研修が主体となっていたが、多くの研修生が 2 週間の研修期間を希望した。セミナールームを使用しないでも実施できる分野のコースもあることから、3 年次には 2 週間の研修を検討し、その後、研修期間を拡大し継続的に実施している。
2-10 PSWC は、州事業実施計画(案)のモニタリングを踏まえ、SWC 研修実施計画に反映する。	・州レベルの事業計画である「水・衛生（WASH）セクター戦略計画 2011-2016 年」(Water, Sanitation and Hygiene (WASH) Sector Strategic Plan 2011-2016) は両 PSWC が研修センター設置計画を立案する前に、策定された。「センナール州 WASH 戦略計画 2011-2016 年」では、セクター能力強化活動として、(1) 全レベルのマネージメントに係る研修：100 名、(2) 全レベルの技術に係る研修：150 名という目標値が掲げられている。「白ナイル州 WASH 戦略計画 2011-2016 年」では、セクター能力強化活動として、(1) SWC と州保健省（MoH）職員の WASH に関する研修：120 名、(2) 技術に係る研修：150 名という目標値が掲げられている。 に沿った、研修計画が策定されている。 ・両パイロット州 SWC は人材育成アクションプランを策定した。同計画には、①人材育成のコンセプト、②給水の課題、人材育成のニーズ、研修対象、③人材育成の実績、④研修実施体制、⑤今後 3 年間の研修計画（研修コース数、研修生数、予算等）が含まれている。

成果 3：PSWC の研修実施と給水施設維持管理のモニタリング体制が確立される

3-1 DWSU、PSWC において、モニタリングユニットを設置する。

・PWC（DWSU の前身）の管轄省である灌漑・水資源省は、2011 年 12 月に水資源省に改編し、その後、2012 年 7 月に水資源・電力省に改編された。これらの度重なる組織改編や統廃合により、本プロジェクト当初から要請されていたモニタリングユニットの設置にも遅れが生じ、中間レビュー時に早急な設置を提言されていた。その後、DWSU 及び PSWC ともに体制が整備された。

・DWSU と PSWC は協力し、両機関の実施責務（案）を作成した。

組織	部署名	メンバー	設置年月
DWSU	Monitoring and Evaluation Department	5	2014 年 12 月
センナール州 SWC	Monitoring Follow-up and Evaluation Unit	9 SWC 職員 + 各ローカリティ/セクター事務所モニタリングオフィサー	2014 年 12 月
白ナイル州 SWC	Monitoring and Evaluation Unit	10 SWC 職員 + 各ローカリティ/セクター事務所モニタリングオフィサー	2014 年 12 月

3-2 PSWC が行うモニタリングのマニュアル（案）を DWSU が作成する。

・DWST では JCC 会議の機会を通じ、モニタリングフォーマット（案）の内容の説明を行い（2014.01.29）、その後、第 1 回モニタリングワークショップを開催し、モニタリング実施目的、実施項目の検討、モニタリング用フォーマット内容の協議を行った。（2014.02.05）また、国際機関を巻き込んだモニタリングセミナーの開催に関する協議も実施された。（2014 年 2 月 25 日）

・DWST のモニタリング評価部署の職員が、両 PSWC でモニタリングワークショップを開催し、モニタリング実施計画書の作成（①研修のモニタリング、②SWC の事業運営に係るモニタリング、③給水施設のモニタリング）、給水施設現場への訪問、同モニタリング実施計画案の局長へのプレゼン、中央と州レベルのモニタリングの役割の確認を行った。（白ナイル SWC:2014 年 10 月 26-29 日、センナール SWC：11 月 2-5 日）。同ワークショップの結果を踏まえ、モニタリングマニュアル案の作成を行った。

・3-4 の活動結果を踏まえ、モニタリングワークショップが開催され、モニタリング計画及びモニタリングマニュアル（研修用）（ウォーターヤード用）の修正作業を行った。参加者はどのようにウォーターヤード維持管理のモニタリング体制を強化するか、オペレーターから、郡・セクター事務所、SWC モニタリング評価ユニット、DWSU への情報フローについて協議した。（センナール州 SWC: 2015 年 1 月 25-28 日、白ナイル州 2015 年 2 月 1-4 日）

・最終的に、ウォーターヤードのモニタリング様式は以下活動 3－4 に記載の通り開発された。

3-3 PSWC が給水施設維持状況のベースライン調査を実施する。

・1 年次に各 PSWC のローカリティにおける給水施設維持状況のベースライン調査を実施した。

・3 年次には給水施設周辺の衛生環境に関するベースライン調査を実施した。

・4 年次には PSWC のモニタリング計画に基づき、モニタリング評価ユニットメンバーと郡のセクター事務所職員と現場のオペレーターは、モニタリングマニュアル（3-2 で開発されたモニタリング様式含む）に従いベースライン情報を収集した。

3-4 PSWC はモニタリングマニュアル（案）に基づき、研修実施、州での事例、給水施設維持管理モニタリングを定期的に実施する。

（1）研修実施モニタリング

・各州のモニタリング計画（“Sennar SWC Monitoring Plan – Human Resources Development (Training)”, “White Nile SWC Monitoring Plan – Human Resources Development (Training)”）に基づき、定期的にモニタリング報告書を作成し、DWST へ提出している（3 ヵ月毎）。両 PSWC は「研修データベース」「職員データベース」が開発された。PSWC の研修コーディネーターはコース毎にモニタリングを実施し、データベースを更新している。

（2）ウォーターヤード維持管理モニタリング

・モニタリング評価ユニットメンバーは以下のウォーターヤード維持管理のモニタリング様式を開発した。

様式名	用途
ベースライン調査（Water yard monitoring sheet for baseline survey）	SWC 技術チームによるベースライン情報モニタリング用（項目：1. SWL/DWL, 2. Water tariff rate, 3. Water quality checkpoints, 4. Condition of the borehole, 5. Sanitary condition）
年次調査（Water yard monitoring sheet for annual survey）	SWC 技術チームによる年次・季節モニタリング用（項目：1. SWL/DWL, 2. Water tariff rate, 3. Water quality checkpoints, 4. Condition of the borehole, 5. Sanitary condition）
季節調査（Water yard monitoring sheet for seasonal survey）	
月次調査（Water yard monitoring sheet for monthly survey）	SWC 郡職員（料金徴収、O&M チーム）月次モニタリング用（項目：1. Total condition of facility, 2. Condition of control panel, 3. Condition of tank, 4. Condition of distribution point）
各日オペレーター記録（Daily monitoring sheet for operators）	オペレーター各日記録用（項目：1. Total condition of facility, 2. Condition of the pump, 3. Operating time (AM/PM), 4. Condition of the generator, 5. Total hours of operation (hour/day)）

	・PSWC モニタリングユニットは、モニタリングワークショップにて作成されたモニタリング実施計画をもとに、モニタリングに係る費用を積算し、承認を受け、2014 年 11 月から、研修実施、及び、以下のモデル地区の給水施設維持管理のモニタリング（ベースライン調査）を DWSU の参加の下、実施した。 【センナール州】対象地域：シンジャ郡、ウォーターヤード対象：約 116 カ所 【白ナイル州】対象地域：タンダルティ郡、ウォーターヤード対象：約 114 カ所
3-5 DWSU と DWST はモニタリング結果を分析し、SWC の研修実施実績と他州での事例等の分析結果を共有する。	（1）研修実施モニタリング ・3 年次、4 年次には、DWSU のモニタリングユニットが主導で、活動 3－1 から 3－5 に係る取り組みを、JCC 及び合同セミナーを通じ、他州と情報を共有している。 （2）ウォーターヤード維持管理モニタリング ・DWSU と PSWCs のモニタリングユニットメンバーは、2015 年 3 月の JCC で活動 3-4 にあるウォーターヤードのモニタリング結果を発表する計画である。 ・モニタリング計画とモニタリングマニュアルに基づき、SWC 郡/セクター事務所により収集されたデータは、PSWC モニタリングユニットで蓄積される予定である。同ユニットは、月次調査と年次調査（年 2 回）を実施し、結果を DWSU モニタリング評価部へ提出予定である（6 カ月毎）。
3-6 DWSU はモニタリングデータを情報センターで管理する。	（1）研修実施モニタリング ・フェーズ 1 に確立した研修能力の変化をモニタリングするフォーマットと評価手法に基づき、フェーズ 2 においても DWST は継続して研修実施にかかるモニタリングデータを管理している。DWSU の情報センターはモニタリングユニットと同じ人材が配置されており、これまで収集されたモニタリングデータの一元管理を進めている。 （2）ウォーターヤード維持管理モニタリング ・3-5 で述べたモニタリング計画に基づき、DWSU はウォーターヤードに関するモニタリングデータを PSWC から 6 カ月毎に受け取る予定である。その情報を DWSU で管理するデータベースに更新していく。これらの情報は、ドナーなどから提供される資機材を適切な場所に分配していくために活用されることを意図している。
3-7 DWSU はモニタリング結果をもとにモニタリングマニュアルの最終版を作成する。	・活動 3-2 のとおり、DWSU はモニタリングマニュアル（案）を作成した（2014 年 1 月）。2014 年 2 月、10-11 月、2015 年 2 月とワークショップを開催して同案を協議し、最終化した。（“DWSU Monitoring manual – Water Yard. March 2015” and “DWSU/DWST Monitoring manual – Human Resources Development (Training). March 2015”） ・同マニュアルは完成後、全 SWC へ配布予定。（2015 年 3 月予定） ・加えて、活動 3-4 のとおり、モデルサイトでのモニタリング結果を踏まえ、両 PSWCs のモニタリング評価ユニットはウォーターヤードの改修計画（“Action Plan－Water Yard Rehabilitation” ）を策定した（2015 年 2 月）。改修対象は、白ナイル州タンダルティ郡 10 カ所、センナール州シンジャ郡 14 カ所である。
成果 4：DWST による支援の下、その他 SWC における研修実施体制が整備される	
4-1 DWST はアウトプット 1 、2、3 を踏まえて SWC で活用される人材育成マニュアルを作成する。	・DWST は中長期人材育成計画と並行して、人材育成マニュアルの作成を開始している。2015 年 3 月までに完成させ、その後、各州水公社に配布を予定している。
4-2 パイロット州以外の SWC は研修ユニットを設置する。	・各 SWC における研修センター設置状況は以下の通り。フェーズ 2 開始以降（2011 年 11 月）、新規に研修センターが完成した州は、白ナイル州（2011 年 11 月）、センナール州（2012 年 4 月）のパイロト州に加え、北部州（2013 年 3 月）、ナイル州（2014 年 1 月）、ゲジラ州（2012 年 12 月）、北コルドファン州（2014 年 4 月）、UNICEF の WES プロジェクトの支援により建設された南コルドファン州、西ダルフール州、南ダルフール州である。

設置済み （既存建物の改修中含む）	未設置
1. 白ナイル州（パイロット州）、2. センナール州（パイロット州） 3. 北部州、4. ナイル州、5. ゲジラ州、6. ゲダレフ州、7. カッサラ州、8. 北コルドファン州、9. 紅海州（改修中）、10. 南コルドファン州、11. 北ダルフール州、12. 西ダルフール州、13. 南ダルフール州、14. 青ナイル州（改修中）	1. 中央ダルフール州（西ダルフール州より 2012 年 1 月分離）、 2. 東ダルフール州（南ダルフール州より 2012 年 1 月分離） 3. 西コルドファン州（新規設置予定のため既存建物を改修中、南コルドファン州より 2013 年 1 月分離）

・北部州、ナイル州、ゲジラ州、ゲダレフ州、紅海州、北コルドファン州へは研修センターへの機材が供与された。（「付属資料 1.　協議議事録　ANNEX 2-5: List of Equipment procured under the Project 参照）

<table>
<tr><td>4-3 DWST は PSWC の活動成果を他州の SWC と共有するための合同セミナーを開催し、人材育成マニュアルとモニタリングマニュアルを配布する。</td><td colspan="5">・合同セミナーの開催を通じ、異なる州の SWC 関係者が他州の研修センターに集合し、施設の視察、研修課題の議論、情報共有を行った。同セミナーを主催することで、SWCs は施設維持管理面を含む自助努力の成果が評価されるとともに、研修センターの活動を州内外のステークホルダーへ宣伝できる機会となった。
<table>
<tr><th></th><th>開催日</th><th>場所</th><th>トピック</th><th>参加者</th></tr>
<tr><td>1</td><td>2012.04.18</td><td>センナール州 PWC</td><td>・専門家によるパイロット州研修センターの活動意義の説明</td><td>41 名（センナール州、白ナイル州）</td></tr>
<tr><td>2</td><td>2012.11.10</td><td>ゲジラ州 PWC</td><td>・ゲジラ州研修センター説明、視察</td><td>22 名（DWST（3）、白ナイル州（4）、センナール州（2）、北部州（1）、ゲジラ州（8）、JICA 専門家（4））</td></tr>
<tr><td>3</td><td>2013.02.11</td><td>白ナイル州 PWC</td><td>・研修センターの整備、研修実施にかかる情報交換、中央と地方の役割分担、中央に対する要望</td><td>30 名（DWST、ゲジラ州、紅海州、センナール州、北コルドファン州、白ナイル州、JICA 専門家）</td></tr>
<tr><td>4</td><td>2013.11.17</td><td>白ナイル州 PWC</td><td>・白ナイル州研修センターの良好な維持管理体制
・エル・ゲジーラ州に最優秀研修センター賞授与
・DWST の研修センター長、白ナイル州、センナール州、カッサラ州及びエル・ゲジーラ州の各研修センター長による研修エンターの特徴、研修、課題の発表</td><td>50 名（DWST、エル・ゲジーラ州、カッサラ州、センナール州、青ナイル州、北コルドファン州、南コルドファン州、西ダルフール州及びハワタプロジェクト）</td></tr>
<tr><td>5</td><td>2014.04.28</td><td>北コルドファン州 PWC</td><td>・2 年の歳月をかけてモデルとなる研修センターを建設した北コルドファン州研修センター施設や、機材、備品を視察
・北コルドファン州研修センターへベスト研修センター賞授与
・北コルドファン州、北部州、ナイル州、北ダルフール州及びセンナール州の 5 州、それぞれの水問題と研修センターの活動の報告</td><td>70 名（DWST、北部州、ナイル州、紅海州、エル・ゲジーラ州、センナール州、北コルドファン州、南コルドファン州、北ダルフール州及びハワタプロジェクト）</td></tr>
<tr><td>6</td><td>2014.11.27</td><td>北部州 PWC</td><td>・北部州に建設された研修センター訪問、施設と研修内容発表
・ゲダレフ州、南ダルフール州、センナール州、北コルドファン州の成果発表、各州の研修実施計画</td><td>40 名（北部州、ドンゴラ大学、ナイル州、白ナイル州、センナール州、ガダレフ州、紅海州、北コルドファン州、ゲジラ州、ハワタプロジェクト、西ダルフール、南ダルフール州）</td></tr>
<tr><td>7</td><td>2015.8-9 予定</td><td>DWST</td><td>・各州に建設された研修センターの最終的な評価と今後の活動内容の協議</td><td></td></tr>
</table></td></tr>
</table>

4-4 パイトロット州以外の各州水公社は SWC 研修実施計画を策定する。

・SWC は DWST、PSWC、JICA 専門家による技術アドバイスに基づき、以下の通り研修コースを計画、実施している。
（＊予算については、研修センター予算ではなく SWC 全体予算を提示している州も有り）

SWC（DWST 研修への参加者数 2008-2014 年）	研修施設 ◎設置済, ▲改修中, × 未定	2014 研修		予算(SDG)＊		備考（2015 年計画等）
		実施コース数	研修生数	2014 年	2015 年（計画）	
北部州　(60)	◎	7	104	432,360	425,680	- 2015 年計画：15 コース（GIS、組織化、財務報告、英語、管網設計、給水施設、統計、エンジニアリング法令）、人材育成啓発研修セミナー、ラボ機材調達（イタリアより、200,000SDG 相当）、収入向上計画（施設の式典用貸出し、車両修理）
ナイル州　(76)	◎	7	96	166,063	140,000	-2015 年計画：7 コース（飲料水場維持管理、コンピュータ（エクセル、ワード）、人材育成管理、GIS、飲料巣ネットワークの設置）
ゲジラ州　(91)	◎	18	302	361,400	542,100	- 研修センター建設費用: 1,479,550 SDG - 2015 年計画：ワークショップの改修、19 コース（モニタリング評価、報告書作成、ハンドポンプ維持管理、配管網管理、コミュニティ啓発、給水施設、電気機材、衛生管理、井戸管理、データベース管理、GIS、コンピュータ財務管理、調達・供給データベース、PC スキル）
ガダレフ州　(60)	◎	-	-	15,000	250,000	-2015 年計画：エンジニア、顧客サービス、作業者向け研修
カッサラ州　(82)	◎	1	14	-	350,000	- 2014 年：財務研修 - 2015 年計画：155 名　（アドミン 15 名、財務 45 名、PC スキル 20 名、技術エンジニアリング・電気維持管理 15 名、ウォーターヤードオペレーター50 名、DWST10 名）
紅海州　(40)	▲	1	20	35,000	10,000-	既存研修センターを改修中。
青ナイル州　(74)	▲	2	-	-	-	- 2014 年：給水場の維持管理、ウォーターヤード管理 - 2015 年計画：4 コース（会計、顧客アカウント、GPS（研修生 20 名テクニシャン、エンジニア）
北コルドファン州（65）	◎	25	516	95,000	528,212	- 2015 年計画：39 コース（対象：1,380 名）、 - ミネラルウオーター工場設置、研修センター宿泊施設建設、小規模ウォーターヤード建設、小学校における衛生管理コミュニティリーダーシップ
南コルドファン州（153）	◎	-	-	-	-	
西コルドファン州（17）	▲	-	-	-	-	新規開設に向け、既存の建物を改修中。
南ダルフール州（124）	◎	0	0	-	-	-2015－2016 計画： OJT（UNICEF 支援）、5 コース
西ダルフール州（119）	◎	1	30	20,000	60,000	-2015 年計画：9 コース（水質管理、データベース管理、報告書作成）
東ダルフール州　(35)	×	-	-	-	-	- 研修センター設置未定
中央ダルフール州（44）	×	-	-	72,000	210,800	- 研修センター設置未定であるが、以下の研修を実施、計画との情報有り。 - 2014 年実績： 7 コース（物理探査、水質分析、ポンプ運転、コミュニティ動員、ハンドポンプ機械、塩素注入、統合水源管理）、245 名。 - 2015 年計画：13 コース（給水施設管理、コミュニティベース維持管理、ポンプ運転、ハンドポンプ機械、塩素注入、太陽光システム、政策者向け啓発、掘削業者調達管理、人事・財務、モニタリング評価、ウォーターハーベスト、統合水資源管理）587 名。
北ダルフール州 (108)	◎	1	30	100,000	700,000	- 2015 年計画：TOT 125 名
ハルツーム州　(38)	◎	-	-	-	-	ハルツーム州所有の研修センターはないが、DWST の所在地はハルツーム市内である。

出所：DWST、JICA 専門家提供資料、本調査による質問票回答。