Groundwater Resources Governance in Transboundary Aquifers (GGRETA Project)

Stampriet Transboundary Aquifer System Case Study

SUMMARY OF THE FOURTH REGIONAL TECHINCAL WORKSHOP

AND

INTERNATIONAL WATER LAW TRAINING

Peermont Mondior Hotel, Gaborone (Botswana)

5-8 May 2015

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LIST OF ABBREVIATIONS

AIDA	**International Association for Water Law**
DWA	**Department of Water Affairs, Botswana**
DWAF	**Department of Water Affairs and Forestry, Namibia**
DWS	**Department of Water and Sanitation, South Africa**
ERU	**Equitable and Reasonable Utilization**
GGRETA	**Groundwater Resources Governance in Transboundary Aquifers**
GMI	**Groundwater Management Institute**
MCCM	**Multi-Country Consultation Mechanism**
MMEWR	**Ministry of Minerals, Energy and Water Resources of Botswana**
MoU	**Memorandum of Understanding**
NPD	**National Policy Dialogue**
ORASECOM	**Orange-Senqu River Commission**
IGRAC	**International Groundwater Resources Assessment Centre (UNESCO category 2 centre)**
IMS	**Information Management System**
ISARM	**Internationally Shared Aquifer Resources Management Programme of UNESCO and IAH**
IWRM	**Integrated Water Resources Management**
PCCP	**From Potential Conflict to Cooperation Potential**
PJTC	**Permanent Joint Technical Commission**
SADC	**Southern African Development Community**
SDC	**Swiss Agency for Development and Cooperation**
STAS	**Stampriet Transboundary Aquifer System**

TBA	**Transboundary Aquifer**
TWAP	**Transboundary Waters Assessment Programme**
UNECE	**United Nations Economic Commission for Europe**
UNESCO-IHP	**United Nations Educational, Scientific and Cultural Organization International Hydrological Programme**
UNGA	**United Nations General Assembly**
UNWC	**1997 United Nations Watercourses Convention**
WRC	**Water Research Commission**

BACKGROUND

The Governments of Botswana, Namibia and South Africa, jointly with the UNESCO International Hydrological Programme (UNESCO-IHP) and the International Groundwater Resources Assessment Centre (IGRAC) organized the 4th Regional Technical Workshop on the assessment of the Stampriet Transboundary Aquifer System (STAS) within the framework of the "Groundwater Resources Governance in Transboundary Aquifers" (GGRETA) project, funded by the Swiss Agency for Development and Cooperation (SDC). The technical meeting was held on 5-8 May at Peermont Mondior Hotel, Gaborone, Botswana.

The workshop aimed at presenting the results of the integrated aquifer assessment, which includes options of Multi-Country Consultation Mechanism (MCCM) for improving the management of the STAS. The workshop was also dedicated to provide:

1) trainings on water diplomacy and water cooperation organized by UNESCO From Potential Conflict to Cooperation Potential (PCCP) programme. Trainings consisted of the presentation of the United Nations Economic Commission for Europe – UNECE – Water Convention, and a workshop on enhanced negotiation skills and dispute resolution), and

2) training on international water law organized by the International Association for Water Law (AIDA) which covered the linkages between international water treaties and national water laws, and implementation of national water laws.

OBJECTIVES

- To present and discuss the results of the integrated assessment of the Stampriet Transboundary Aquifer System (STAS)
- To present and discuss the impacts of natural and human development on the system and policy and institutional responses
- To discuss priorities for further action to improve management of the transboundary aquifer including Multi-country Consultation and Cooperation Mechanisms (MCCM)
- To agree on workplan for follow-up on the integrated assessment of the Stampriet Transboundary Aquifer System (STAS)
- To provide a presentation of the UNECE Water Convention
- To provide a workshop on enhanced negotiation skills and dispute resolution
- To provide training in international water law (including national water law) by presenting principles and the practice of law as it applies to water resources.

The Agenda of the meeting is attached as Annex 1 to this report. The List of Participants is attached as Annex 2.

OUTCOMES

- Validation of the results of the integrated assessment of the Stampriet Transboundary Aquifer System (STAS).
- Agreement on a revised structure and content of the integrated assessment report of the STAS (Annex 3).
- Agreement on the content of the integrated assessment report of the STAS, which includes harmonized hydrogeological, socio-economic, environmental, legal and institutional data.
- Presentation of two options of Multi-country Consultation and Cooperation Mechanisms (MCCM) to be presented to Political Heads (including core tasks, structure, legal arrangements, funding arrangements, advantages, and disadvantages as presented in Table 7):
    - Coordinating STAS Committee
    - Standing ORASECOM Committee
- Agreement on a workplan for follow-up on the integrated assessment of the STAS through a stakeholder consultation mechanism to be held at the end of July with external participants.

SUMMARY

1. Welcome remarks from the Ministry of Minerals, Energy and Water Resources (MMEWR) of Botswana

Mr Phofuetsile (Deputy Director, DWA, Botswana) opened the meeting by highlighting the importance of the project as it has already contributed to better understand the dynamic and importance of the Stampriet Transboundary Aquifer System (STAS). He stressed the fact that the STAS has a crucial role for local communities' survival in the region, particularly in times of drought, where no surface water is available. He finished his opening speech by thanking the Swiss Agency for Development and Cooperation (SDC) for supporting the project[1].

2. Overview of the integrated assessment of the Stampriet Transboundary Aquifer System (STAS)

Mr Ross (GGRETA project coordinator, UNESCO-IHP) welcomed participants, introduced the objectives, agenda and schedule of the meeting, the key findings of the integrated aquifer assessment, and options for a Multi-Country Consultation Mechanism (MCCM) for improving the management of the Stampriet Transboundary Aquifer System (STAS).

2.1. *Overview of the state of the aquifer hydrogeological aspects (Day 1)*

Mr Kirchner (Regional Project Coordinator, Namibia) presented the hydrogeological assessment of the STAS. The STAS stretches from Central Namibia into Western Botswana and South Africa's Northern Cape Province, and lies within the Orange River Basin. The STAS covers a total area of 86643km², of which 73% of the area is in Namibia, 19% in Botswana, and 8% in South Africa. The

[1] Heads of Namibian and South African Delegation could not attend the meeting.

STAS is located in an arid area with mean rainfall varying between 150 to 310 mm/yr and high temperature fluctuations in time. Mean temperature in the STAS varies between 19 and 22°C, with minimum winter temperature around 0°C, and maximum summer temperatures that might go up to 50°C. Temperature is lower in the northern and central area.

The STAS is made up of two deep confined transboundary aquifers (Auob and Nossob), overlain by unconfined Kalahari aquifers. The Auob and Nossob are confined artesian aquifers with isolated outcrops in some areas of the extreme western part of the STAS in Namibia. The geo-referenced boundary and conceptual model of the STAS is shown in Annex 4. An illustration of a cross section of the STAS is shown in Annex 5.

Recharge of the STAS can be restricted only to precipitation. Recharge to the Auob and Nossob aquifers in normal rainfall years is negligible but considerable recharge occurs through sinkholes during extreme rainfall events. During years of average rainfall, recharge to the Kalahari aquifers is estimated at 0.5% of rainfall, while recharge of the Auob and Nossob aquifers is almost non-existent. During wet years, all groundwater recharge can be as much as 3% of rainfall. It is worth mentioning that recharge rates of the Auob and Nossob aquifers are very difficult to assess because of insufficient long-term rainfall and water level records. The predominant discharge mechanism for the Kalahari aquifers is evapotranspiration. The only discharge mechanism for the Auob and Nossob aquifers is through draining into the Kalahari aquifers in 1) the southeast of the Namibia portion of the STAS, 2) the southern Botswana part of the STAS and it is assumed that it is also the case in the 3) the north-western Cape part in South Africa. In those areas, the Kalahari aquifers consist mainly of fine sand, silt and clayey deposits, which have accumulated mineral salts due to evaporation and favoured by low rainfall and runoff, resulting in high salt concentrations (also referred in literature as Salt Block). The general direction of groundwater flow in the Kalahari, Auob and Nossob aquifers follow the surface slope from high to low (i.e. northwest to southeast).

The STAS faces a serious deficiency of time-series data, be it temperature, rainfall, abstraction, monitoring water levels (and also water quality which will be addressed in Chapter 3). Time-series data are incomplete; data are partly lost; partly they were never captured; and the captured data are largely not properly edited. In spite of collecting an extensive amount of available data from which a conceptual model has been derived, data are still lacking to develop a detailed picture of the dynamics of the STAS; provide reliable recharge and discharge estimates; and to further depict groundwater level patterns. This applies to both a snapshot of current conditions and to trends over time. The main findings and recommendations of the hydrogeological assessment are presented in Table 1 and Table 2, respectively.

Main findings of the STAS hydrogeological assessment:
• Further investigations are needed to fully understand the stratigraphy of the STAS, especially in Botswana and South Africa given that no boreholes penetrating the Nossob aquifer in Botswana, and the Auob and Nossob aquifers in South Africa have stratigraphy information. • There is a serious deficiency of time-series data, be it temperature (only 2 stations fall within the STAS), rainfall (only 2 stations fall within the STAS); abstraction; monitoring water levels; or water quality. These time-series data are incomplete, and data has been partly lost, and

when captured, data are largely not properly edited.

- Leaking boreholes penetrating the Auob and Nossob aquifers produce enormous water losses by continuous outflow in the Kalahari aquifers, and consequently, significant impact on its water quality.
- There is a lacking control of drilling activities through which the STAS is often damaged by permanently wasting water when boreholes penetrating the Auob and Nossob aquifers are not properly sealed.
- Projections of climate change impacts in the STAS are difficult to be addressed .There is insufficient data to make meaningful temperature and rainfall maps.

Table 1 - Main findings of the STAS hydrogeological assessment

Preliminary recommendations and key points from the discussion:
• Need to drill monitoring boreholes penetrating the Auob and Nossob aquifers in Botswana and South Africa in order to obtain further data on the statigraphy of the STAS. • Need to promote regular groundwater monitoring campaigns for developing integrated database system containing water level, abstraction, and chemistry data (e.g. TDS, nitrates, sulfates, fluoride), and consequently ensuring environmental protection of the STAS (especially the Auob and Nossob recharge zones in Namibia). Additionally, it is worth mentioning that although being commonly overlooked, there is a need to collect other types of hydrologic information as part of a water-level monitoring program. Meteorological data, such as precipitation data, aid in the interpretation of water-level changes in observation wells. • Need to map malfunctioning wells and boreholes to facilitate possible rehabilitation programmes. • Need to carefully review, improve (if needed), harmonise and promote well drilling and borehole construction standards and guidelines. • Need to promote studies on the impact of climate change on the STAS. There is insufficient data to make meaningful temperature and rainfall maps. • A simplified presentation of the complicated stratigraphy is needed for communication to decision-makers and communities. • The transboundary resources of the STAS need to be clearly defined – including elements of the shallow Kalahari aquifers as well is the deeper aquifers. This was further emphasised in discussions in subsequent sessions. • Further efforts are needed to make an accurate description of the degree of confinement of the deeper aquifers, recharge mechanisms (e.g. through sinkholes in calcrete) and recharge locations. • Further efforts are also needed to consolidate information on borehole yields. • It would be useful to make a graphical presentation of the aquifer showing different uses. • A map based on "info graphic" could be developed to give a visual picture of the main issues relating to the aquifer and its use: drivers, pressures, state variables and responses.

Table 2 - Preliminary recommendations and key points from the discussion

2.2. *Overview of the state of the aquifer socioeconomic and environmental aspects (Day 1)*

Mr Kenabatho (Regional Assessment Coordinator, Botswana) outlined socio-economic aspects. The STAS is lightly populated with population concentrated in small rural settlements. The population of these settlements is estimated at approximately 40,000. It is difficult to estimate the total population of the area because it includes an itinerant population. Major settlements in Namibia are Aranos, Koes and Stampriet, in Botswana are Ncojane and Kule. Groundwater is the major source of water in the STAS, providing potable water for people, livestock and irrigation. Surface water pans in some areas collect water used by livestock during the rainy season. There are neither intensive industries nor mining activities taking place in the STAS area. Over 20 million m^3/year are abstracted in the STAS most of which occurs in Namibia (over 95%). The largest consumer of water is irrigation (~46%) followed by stock watering (~38%) and domestic use (~16%). Natural groundwater quality generally decreases towards south-western Botswana and the north-western Cape in South Africa in the Salt Block. Groundwater resources (particularly shallow aquifers) are in threat of localized pollution around settlements, i.e. around boreholes and wells. The main sources of this groundwater pollution are pit latrines, septic tanks & effluent soakaways, sewage works & oxidation ponds, irrigation (incl. use of fertilisers & pesticides), oil/fuel storage & disposal, and dumping sites and unsanitary landfills. It is only the shallow Kalahari aquifer that might currently be under threat by pollution. High levels of nitrates in the Kalahari aquifers are found in some places in Namibia, especially where majority of water abstraction occurs, attributed to anthropogenic activities such as irrigation and stock watering. A significant portion of the Botswanan and South African parts of the STAS is covered by the Kgalagadi Transfrontier Park, where there are few developments and negligible pollution. The main findings and recommendations of the socioeconomic and environmental aspects assessment are presented in Table 3 and Table 4, respectively.

Main findings of the STAS socioeconomic and environmental assessment:
• The STAS is generally light populated (approximately 40000). • It is very difficult to get a good estimate of the number of people moving in and out of the STAS boundary. Most of the data (if available) is at District level, making it difficult to make accurate conclusions at settlement/village level in the STAS. • No major industrial developments in the STAS. • Land use activities include small rural settlements, wildlife/national parks, cattle ranching & commercial irrigation (Namibia in particular). • Pollution risk in the STAS is generally negligible at the current levels of development. • There are some localised potential sources of pollution to the shallow Kalahari aquifers. • While most sources of pollution directly affect the Kalahari aquifers, long-term effects on the deeper aquifers are not known and should be further investigated. • Due to paucity of data, it is very difficult has not been possible to establish the extent of groundwater pollution in the deeper aquifers in the STAS across the three countries. • In Northern Botswana water from the STAS is being transferred to stock ranches outside the STAS.

Table 3 - Main findings of the STAS socioeconomic and environmental assessment

Preliminary recommendations and key points from the discussion:
• Prepare a groundwater pollution risk map; although data limitations were acknowledged. • Include a summary of numbers of tourists visiting the Kgalagadi Transfrontier Park. • Collect further information on the location of leaking boreholes and the extent of the problem. • Collect further information on the economic value of the STAS.

Table 4 - Preliminary recommendations and key points from the discussion

2.3. Overview of the state of the aquifer - legal and institutional setting (Day 1)

Ms Kinyaga (MAWF, Namibia) introduced the legal and institutional assessment methodology and scoring system distinguishing between transboundary and national laws and institutions. The assessment was aimed at establishing whether there is an enabling environment for transboundary aquifer resources management of relevance to the Stampriet Transboundary Aquifer System (STAS). It was based on an analysis of core indicators:

- Existence and comprehensiveness of bi- or multi-national level agreements/treaties, specific to the STAS;
- Existence of non-Transboundary Aquifer -specific agreements/treaties, or other non-binding instruments of relevance to STAS;

The completeness of the legal instruments was assessed in terms of the inclusion of the following:

- Water Utilisation/Abstraction/Well Drilling
- Water Pollution Control
- Settlement of disputes
- Institutional arrangements
- Other matters such as Environmental Protection and Preservation, Prevention of Harmful Effects, Data Exchange, Prior Notification of Planned Measures, Emergency Situations.

There is no legal instrument specific to the management of transboundary aquifers. Groundwater management is integrated into non-specific legal instruments: the Revised SADC Protocol on Shared Watercourses and the ORASECOM Agreement. The two instruments scored high, implying that they include all the necessary elements that make them complete in terms of creating an enabling environment for transboundary aquifer management. The key transboundary institutions are the SADC Water Division and ORASECOM Council, Secretariat and task teams (including the hydrogeology committee). A national legal framework exists to manage groundwater in Botswana, Namibia and South Africa, but there is a varying degree of implementation and enforcement of regulations. In Botswana implementation responsibility is shifting from the Department of Water Affairs (DWA) to Water Utilities, with DWA retaining oversight and regulatory function. In Namibia regulations are still being developed to implement the Water Resources Management Act, 2013. Main findings of the STAS legal and institutional assessment and preliminary recommendations and key points from the discussion are presented in Table 5.

Main findings of the STAS legal and institutional assessment and preliminary recommendations and key points from the discussion:
• There is no legal instrument specific to the management of transboundary aquifers. • Groundwater management is fully integrated into the existing non groundwater-specific legal instruments namely: Revised SADC Protocol on Shared Watercourses and ORASECOM agreement. • National legal framework exists to manage groundwater in Botswana, Namibia and South Africa, but the degree of implementation and enforcement of regulations varies. • Need to assess the common management issues in all three countries, and how they can be addressed through transboundary governance mechanisms, notably, a Multi-Country Consultation Mechanism for the STAS • It is important to keep members of the ORASECOM hydrogeology committee and the SADC Water Division briefed about the project at the earliest available opportunity. • Minutes of the ORASECOM hydrogeology committee would indicate how active it is.

Table 5 - Main findings of the STAS legal and institutional assessment and preliminary recommendations and key points from the discussion

2.4. Overview of projections of future pressures (Day 2)

Mr Carvalho Resende (UNESCO-IHP) presented projections of impacts on the STAS of possible future developments based on the Water Gap model used in the in UNESCO-IHP Transboundary Waters Assessment Programme (TWAP). Two categories of indicators quantifying current water use conditions and climate (so-called "current-state indicators"), and scenarios in 2030 and 2050 (so-called "projected indicators") were presented. Current-state indicators were computed using a consistent set of global climate data, while projections for 2030 and 2050 for two irrigation scenarios:

- Scenario 1: constant irrigated areas until 2050,
- Scenario 2: changed irrigated areas in 2030 and 2050 defined by modelled percent changes per country.

Mr Carvalho Resende alerted that obtained results should be considered with caution due to the uncertainty derived from the non-optimal accuracy and reliability of underlying data (e.g. extrapolation of observed data, assumed trends, etc…). Modelled scenarios indicate that while the STAS is not threatened by over abstraction at current levels of development, this might change if population and irrigation increases. Assuming that population density increases by 30% in 2030, groundwater development stress (mean annual groundwater abstraction / mean annual groundwater recharge) could increase by 15% in Scenario 1 (constant irrigated areas) and 100% in Scenario 2 (increased irrigated areas) in 2030. Key points from STAS projections of future pressures discussion are presented in Table 6.

Key points from STAS projections of future pressures discussion:
• The Water Gap model has been developed for global scale modelling and the assumptions in the model do not give accurate results at a more disaggregated scale. • The scenarios are not sufficiently accurate to be used in the STAS assessment and should not be taken into consideration. • Trends could be extracted from the model e.g. climate and population trends, and used (together with other information) to give some indication of the impact of possible future developments.

Table 6 - Key points from STAS projections of future pressures discussion

2.5. *Overview of Policy and legal and institutional responses - transboundary and national (Day 2)*

The strategy for responding to future challenges in the STAS also includes legal and institutional components. Mr Burchi (GGRETA project legal expert, AIDA) started his presentation by saying that legal and institutional responses could happen at two complementary levels:

- Transboundary: by engaging the three countries taken together,
- Domestic: by engaging each country or pair of countries.

Given that relevant options for legal and institutional responses would be presented in a separate session, Mr Burchi focused his presentation on the legal and institutional responses at the national level. Domestic-level responses should come from domestic groundwater-relevant legislation, and domestic-relevant government administration of each STAS country. Groundwater is public property in the STAS countries (with room for clarification as regards to Botswana). Although groundwater legislation in the STAS countries already regulates well drilling, groundwater abstraction and use and pollution from "point" sources, further legislative responses include 1) modernising groundwater relevant legislation on the statute books, including regulation of groundwater pollution from non-point sources, and man-made interferences with natural recharge, and 2) bringing mining legislation in line with Integrated Water Resources Management (IWRM). The record of implementation and enforcement of regulatory legislation is mixed in all three STAS countries, with room for improvement varying in each country.

Domestic-level institutional response includes a government groundwater administration capable of administering, implementing, and enforcing groundwater relevant legislation, and user-level organizations capable of supplementing government. The institutional component responses include improving coordination of multiple government actors engaging with groundwater, attraction and retention of skilled personnel in the government groundwater administration, and a steady flow of financial resources to the government groundwater administration. Mr Burchi also presented pointers for a long-term response strategy to the challenges ahead of STAS countries, which include:

- Modernizing the groundwater-relevant legislation on the statute books of STAS countries, notably, Botswana.

- Improving the quality and the performance on the ground (implementation and enforcement) of available regulatory mechanisms.
- Improving the quality and the performance of the government groundwater administration.
- Facilitating consultation among government actors prior to making groundwater-relevant decisions.
- Capacitating groundwater users to supplement government in the exercise of selected functions.

Mr Kenabatho noted that while the risk of increased development of settlements, irrigation and mining pose the biggest threat to the STAS, there are a number of immediate challenges with related policy implications. Data deficits, especially lack of time series, constrain good management of the STAS. Where data exist they are often incomplete, not well organised and can be difficult to retrieve. There is a high risk of local pollution around settlements. Pit latrines, oxidation ponds and waste dumps pose particular risks and there are further threats because of poorly constricted and managed bores. The STAS includes large areas where water abstraction and pollution is not subject to regular inspection and controls. Further threats arise from deficiencies in the protection of boreholes, i.e. poorly constructed and managed bores (casing) owing to lack of correct supervision when the casing and seal were placed (i.e. leaking casing that were not repaired). Mr Kenabatho presented some of possible policy and management responses (Table 7). At the national level these include infrastructure investment, additional boreholes, a review of borehole drilling supervision, regulation and licensing, public education, capacity building and stakeholder engagement. At transboundary level, Multi-Country Cooperation Mechanism (MCCM) could include joint monitoring and maintenance, data sharing, development of guidelines on risk management and boreholes, mechanisms for protection of recharge zones and development of proposals for joint and/or external funding.

Policy, management and legal responses	
At national level	**At transboundary level**
• Countries could invest in additional boreholes [e.g. to address data gaps and improve knowledge & management of the STAS] • Infrastructure investments to address **groundwater pollution** • Could **review/develop** borehole drilling **supervision/regulation/licensing** mechanisms to improve borehole equipping procedures **(i.e. casing issues)** • Could review/improve the record of implementation and enforcement of water and groundwater regulations • Obligations to **monitor** [measure] water levels & abstraction levels • Investment in **capacity building esp. groundwater expertise in the STAS**	• Could undertake joint monitoring/maintenance programmes for the STAS, notably through a MCCM • Establish data management/sharing mechanisms (consolidation, analysis, reporting), notably through a MCCM • Reviewing experiences and developing guidelines on borehole mgt/abstraction control/pollution reduction • Develop risk management guidelines related to major new developments • Could undertake joint funding of agreed mgt structure(s) of the STAS, notably through a MCCM • Develop proposal for external funding of priority issues, notably through a MCCM • Develop mechanisms for Protection of

• **Identify and engage stakeholders, &** undertake community education & awareness programs to address **<u>monitoring and management issues</u>**	recharge zones

Table 7 – STAS policy and management responses to future challenges at local and transboundary level

Key points from the policy, management, legal and institutional responses discussion:
• It is important to understand and develop the capacity of local communities to carry out mitigation and monitoring activity. • The STAS assessment is relevant other regional aquifers and countries. It will be important to communicate the results of the assessment through regional bodies (e.g. SADC). • Results of the project need to be communicated to a broader group of stakeholders, using simple understandable language and appropriate media. Mr Ross explained that it is planned to hold a stakeholder consultation meeting in South Africa on 28-31 July[2]. • Consider the establishment of a Multi-Country Consultation Mechanism for the STAS (see also in this regard Tables 9 and 10) • Consider reviewing/upgrading the domestic legislation for groundwater management • Consider upgrading national capacities to administer, implement and enforce domestic water and groundwater legislation

Table 8 – Key points from the policy, legal and institutional responses discussion

3. Demonstration of the project Information Management System (IMS) (Day 2)

Mr Nijsten summarised the objectives of the GGRETA Information Management System (IMS) - to provide a support tool for the governance in transboundary aquifers and a system for storing, sharing and analysing project results. He explained that the IMS is a map based web application that allows both public and password protected viewers, allowing countries to control content of the system. Mr Nijsten then demonstrated the IMS by showing several maps, and the possibility to get information from "behind the map", create overlays and query maps. He showed how to store and share additional information, and add external data for specific analysis. He explained data upload, data publishing and integration of the IMS into the Global Groundwater Information System. Mr Nijsten also raised a number of questions for discussion including content for the system (e.g. which maps to upload), password protection and procedures for user registration.

Mr Nijsten opened the discussion by saying that IGRAC would like to share the responsibility of uploading data and to train and coach key players from the countries. He pointed out that it is important to establish who in project governments would be responsible for deciding on who could upload data, and how to ensure data quality. Finally, it was agreed that a clear distinction needs to be made between password protected data and publicly accessible data.

[2] Subsequently it has been decided to hold this meeting in conjunction with the inception meeting for the assessment of the Ramotswa Transboudary Aquifer, run by the International Water Management Institute (IWMI).

4. Options for a Multi-Country Consultation Mechanism (MCCM) (Day 3)

The morning session of Day 3 of the workshop started with the presentation by Mr. Burchi of three options of a multi-country consultation mechanism (MCCM) for improving the management of the STAS. His presentation included the rationale, objectives and the added value of a MCCM. Mr Burchi emphasized that a MCCM for the STAS would institutionalize GGRETA project-driven cooperation among STAS countries, aimed in the short-term at allowing monitoring of the STAS through regular collection and exchange of data and information, feeding the STAS Information Management System, and at providing a platform for strategy, planning and advice on the development and protection from pollution of STAS groundwater resources in the long-term.

The three initial options of a MCCM for the STAS presented to participants included a Coordinating Committee of country focal points, a Permanent Joint Technical STAS Committee (PJTC), and an ORASECOM Geo-Hydrology Committee. Each option was analyzed and presented by core mandate, legal arrangements, structure, funding arrangements, advantages and disadvantages. A Coordinating Committee (of country focal points) could be implemented quickly, would have a lean institutional structure and relatively low-cost. The disadvantage is that it would have relatively little visibility or guarantee of permanence. A Permanent Joint Technical Committee (PJTC) would have greater permanency and visibility than a coordinating committee, but would involve greater cost to the STAS countries. The use of the ORASECOM Geo-Hydrological Committee as an option for MCCM could be implemented quickly and would require a lean institutional architecture and low cost to STAS countries. However, it would have less permanence and visibility than the PJTC, in addition to the fact that it would be subordinated to ORASECOM priorities. Picking up from Mr Burchi's presentation, participants reacted and provided their feedback (Table 9). The participants suggested narrowing the three initial options of a MCCM for the STAS to two. Subsequently, based on the feedback provided by participants, Mr Burchi fine-tuned the suggested two options. Core mandate, legal arrangements, structure, funding arrangements, advantages and disadvantages are presented in Table 10. An organigram of option 1 (i.e. Coordinating STAS Committee) is presented in Annex 6.

Key points from the Options for a Multi-Country Consultation Mechanism discussion:
• The discussion pointed to some disadvantages of the PJTC as it would generate additional costs, introduce a further level of bureaucracy and could weaken existing mechanisms. • It was emphasised that the MCCM should be linked with SADC and ORASECOM, and also to the new SADC-Groundwater Management Institute at Bloemfontein. • It was also emphasised that much of the work on groundwater management is done locally by local stakeholders. Therefore participants discussed how a MCCM would supports this action. • The results of earlier activities should be taken into account in developing the MCCM (e.g. the 2009-2011 ISARM project on the Stampriet and the 2008 SADC workshop on groundwater). • In conclusion it was decided to drop the PJTC option and further develop the Coordinating Committee and ORASECOM options (presented in Table 10).

Table 9 - Key points from the Options for a Multi-Country Consultation Mechanism discussion

	Option 1 – Coordinating STAS Committee	Option 2 – Standing ORASECOM Committee
Core Mandate	• collection and exchange of data and information among the STAS countries • managing the flow of data and information to the STAS Information Management System • attracting donor funding for the purposes of the STAS • advising STAS countries on the application of available and relevant SADC guidelines to the specifics of the STAS • liaising with SADC and with ORASECOM.	• collection and exchange of data and information among the STAS countries • managing the flow of data and information to the STAS Information Management System • attracting donor funding for the purposes of the STAS • advising STAS countries on the application of available and relevant SADC guidelines to the specifics of the STAS.
Structure	• a Steering Committee of senior government groundwater officials acting as Focal Points, meeting at regular intervals on a rotating basis in the STAS countries, and • a Research Institution in each STAS country, providing scientific input to the Steering Committee.	• Upgraded stature of the already existing Hydrogeology Sub-Committee (under the Technical Task Team in the ORASECOM structure) to a Standing Committee
Legal arrangements and ramifications	• Memorandum of Understanding (MOU), signed by the concerned Water Ministers	• ORASECOM Council decision to upgrade the existing Hydrogeology Sub-committee of the Technical Task Team to a Hydrogeology Standing Committee.
Funding	Each STAS country would bear	Each country will bear the cost of its

arrangements	the cost of hosting the regular meetings of the Coordinating Committee, and providing administrative support for the duration of host duties, on a rotation basis.	representative on the Committee.
Advantages	• expeditiousness of implementation, as a decision to establish a STAS Coordinating Committee can be taken at the level of the Ministries responsible for water resources, and formalized in a MOU signed by the concerned Ministers • leanness of institutional architecture, as the Committee would consist of the representatives of the three Water Departments meeting at regular intervals as a Steering Committee, at no extra costs to the Governments other than the costs of such meetings • economies of scale, as the Committee would rely on the support facilities available in the government departments hosting the meetings of the Committee on a rotating basis • ownership by the STAS countries • visibility • independence from external support for the functioning of the Committee.	• expeditiousness of implementation, as a decision to upgrade the existing Hydro-geology Sub-committee of the Technical Task Team to a standing Hydro-geology Committee can be taken swiftly by the ORASECOM Council, in accordance with the provisions of the agreement • leanness of institutional architecture • economies of scale, as the committee would rely on the support facilities and the resources available to ORASECOM • costs to the STAS countries limited to the regular meetings of the Committee (assuming the Committee will consist of designated government officials already on the government payroll)

Disadvantages	• relative impermanence of the Committee • dependence on the priorities and political agendas of the government water administration hosting the Committee	• zero visibility as far the STAS is concerned, as the STAS would stand on an equal footing to the other known transboundary aquifers in the Orange-Senqu river basin • subordination to the agenda and priorities of ORASECOM • competition with Lesotho's priorities in the Committee • competition for attention and resources from the other known transboundary aquifers in the Orange-Senqu river basin.

Table 10 - Options for a Multi-Country Consultation Mechanism

5. Adoption of workplan for follow-up to integrated aquifer assessment (Day 3)

Mr Ross introduced the workplan for the next stage of the project including finalisation of the integrated assessment of the STAS, stakeholder consultation and further development of a proposal for a MCCM. The workplan was adopted by the meeting and is shown in the following table:

Action	By whom	Deadline
Finalise chapters	All chapter authors	29 May
Finalise integrated assessment report including MCCM options	Mr Kenabatho in consultation with chapter authors and project management team	30 June
Finalise data in IMS	IGRAC, national contact points	30 June
Issue invitations and draft program for stakeholder consultation	UNESCO-IHP	30 June
Presentation of assessment report, and MCCM options to political representatives and stakeholders	UNESCO-IHP	28-31 July
Water diplomacy training	UNESCO-IHP	30 July
Second stakeholder consultation meeting (in the Stampriet area)	UNESCO-IHP	September/October
Final regional technical meeting to present results and discuss future actions	UNESCO-IHP	November/December

Table 11 - Workplan for follow-up to integrated aquifer assessment

6. Closing remarks (Day 3)

During the final session of the workshop there was a brief discussion of prospects for a further phase of the project. Among the points raised were:

- Cooperation between the national technical teams had achieved tangible positive results and it would be productive to continue this cooperation.
- Results of the assessment need to be clearly communicated to a range of audiences using appropriate media.
- Continued cooperation between national contact points and IGRAC is vital to implement the IMS as a decision support system for the project countries and others.

In conclusion Mr Ross again thanked the Government Botswana for hosting the workshop and expressed appreciation for the efforts of the national technical teams in contributing to the aquifer assessment report. He also thanked national representatives and other participants for their excellent contributions to the meeting. This would lead to a much improved assessment report.

Mr Phofuetsile emphasised the importance of the Stampriet case study to the project countries. The strategic significance of the STAS has been underlined during the recent drought in Botswana, and is further illustrated by the possibility of transfer of water from the STAS to ranches in the north of the country. The project is extremely important in consolidating information on the STAS and making it available to decision-makers and in building management capacity through on-the-job and formal training. He expressed the hope that there could be a further stage of the project to develop a Multi-Country Consultation Mechanism (MCCM), and national action to improve management and governance of the STAS. He thanked delegates for their participation and closed the workshop.

7. Water Cooperation session (Day 3)

UNESCO From Potential Conflict to Cooperation Potential (PCCP) Programme organized a Water Cooperation session in the afternoon of Day 3. The Water Cooperation sessions consisted of the presentation of the United Nations Economic Commission for Europe (UNECE) Water Convention and a workshop on enhanced negotiation skills and dispute resolution.

7.1. Presentation of the UNECE Water Convention

The afternoon session of Day 3 of the workshop consisted of a water cooperation session that included a presentation of the United Nations Economic Commission for Europe (UNECE) Water Convention followed by a workshop on Enhanced negotiation skills and dispute resolution organized by UNESCO's From Potential Conflict and Cooperation Potential (PCCP) Programme. The session started with a presentation by Dr Rieu-Clarke (University of Dundee) on the main principles and obligations of the UNECE Water Convention (i.e. prevention, control and reduce transboundary impact, equitable and reasonable utilization and participation, and cooperation), and the evolution from a pan-european to global legal framework. His presentation also covered the institutional framework and overarching requirement under the UNECE Water Convention, as well as a series of

minimum appropriate measures to address significant transboundary adverse effect on the environment caused by human activity. During this session, focus was given to transboundary groundwaters and the relationship between the UNECE Water Convention and the United Nations Watercourses Convention (UNWC) in order to provide a solid introduction to the international water law training held on Day 4 of the workshop. Dr Rieu-Clarke highlighted that 1) the UNECE Water Convention covers surface water *or* groundwater, while the UNWC only covers surface water and *connected groundwater,* 2) the UNECE Water Convention has stronger obligation to enter into basin-specific agreements and joint institutional arrangements, 3) the UNECE Water Convention has more detailed procedural requirements, while the UNWC is more detailed on notification, and Equitable and Reasonable Utilization (ERU) factors, 4) contrarily to the UNWC, the UNECE Water Convention includes institutional framework (Meeting of the Parties, Secretariat, etc).

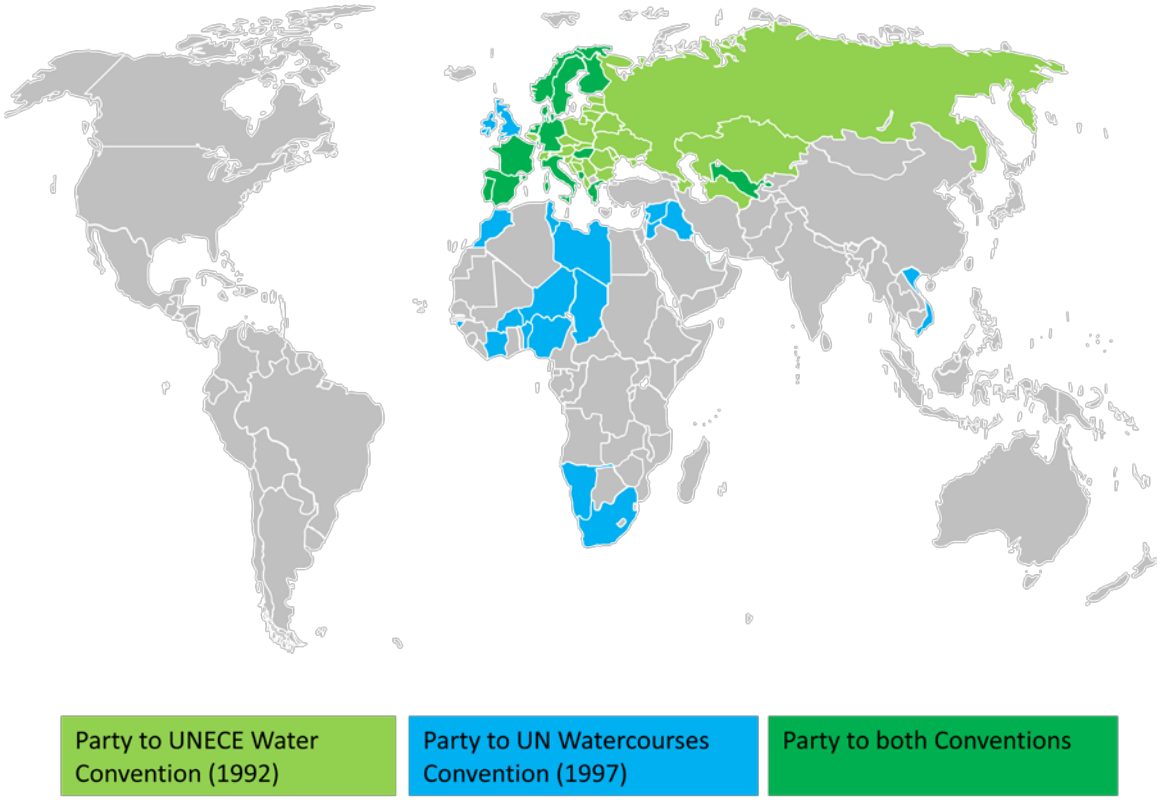

Figure 1 – Parties to the UN Watercourses Convention (1997) and UNECE Water Convention (1992)

Picking up from the presentation of the UNECE Water Convention, Mr Liiv (Ministry of the Environment of Estonia) presented the Estonian experience on how UNECE Water Convention has benefited and supported transboundary water cooperation on the ground. UNECE Water Convention has provided a strong institutional framework and a comprehensive programme of work supporting the development of soft-law tools (e.g. guidelines), projects on the ground (e.g. National Policy Dialogue – NPD, capacity building), advisory services (e.g. new agreements, establishment of joint bodies for institutional framework and programme of work). Additionally, Mr Liiv presented the benefits of transboundary water cooperation through the bilateral cooperation between Estonia and the Russian Federation.

Based on the UNECE Water Convention, an agreement between Estonia and the Russian Federation was signed in 1997. Since then, an Estonian-Russian Joint Commission on transboundary waters was created for Lake Peipsi. Some key points of the latter are:

- Joint three year action program
- River basin management plans on both sides of the border
- Joint monitoring and comparison of results
- Systematical exchange of information about situation in water management and water quality
- Emergency information exchange
- Investments on both side for wastewater treatment
- Years of intensive work by officials, scientists and local people have made the lake one of the most well studied and protected

Mr Liiv concluded his presentation emphasizing that the UNECE Water Convention has supported governments to estimate the broad range of potential benefits of transboundary waters cooperation as presented in Table 12.

	On economic activities	**Beyond economic activities**
From improved water management	**Economic benefits** • Activity and productivity in economic sectors • Economic impacts of water-related hazards	**Social and environmental benefits** • Health impacts • Employment and poverty • Cultural value, recreation
From enhanced trust	**Regional economic integration benefits** • Goods, services, labour • Cross-border investments • Infrastructure networks	**Peace and security benefits** • Peace and security • Avoided cost of military conflict, military spending

Table 12 - Potential benefits of transboundary waters cooperation

7.2. Workshop on enhanced negotiation skills and dispute resolution - UNESCO's Potential Conflict and Cooperation Potential (PCCP)

Mr Mahfoud conducted a workshop on enhanced negotiation skills and dispute resolution. The objective of the workshop was 1) to train participants on enhancement of hydro-diplomacy capacities and skills, and 2) to set the series of trainings that will support the process of trust-building and cooperation for improving the management of the aquifer. The workshop was divided in two parts. The first part focused on trust-building as a starting point for effective negotiation and collaboration between scientists, decision-makers as well as other stakeholders such as the private

sector. Participants were divided in groups of 4 or 5 ensuring interdisciplinary, international, and inter-generational equity amongst them. Each group was asked to draw a mapping of stakeholders involved in the management of an aquifer in an A1 sheet of paper. Participants then started discussing in a deliberately unofficial setting the scale of management that should covered, identifying the stakeholders, and determining the linkages between them, their influence, interaction and interdependency. Discussions consisted of participants trying to find consensus on several critical issues, such as:

- The inclusion of the biosphere as part of the stakeholders being itself a user of the groundwater
- Whether or not national borders should be drawn
- Linkages of the stakeholders to a specific scale and how to determine the limit of the scaling?
- How to divide stakeholders? (users/administrative, influential/decision-maker, vertical/horizontal/circular connection, etc…)

After 45 minutes of discussion, each group then presented their drawing to the rest of the participants followed by a brief session of questions and answers.

The second part of the workshop consisted of imagining an action, a product or a document that would gather all the identified stakeholders and involve them in a common willingness to jointly manage groundwater, taking into consideration the interaction between them and the context of climate change. Participants felt at ease with the unconventional setting, and consequently reflected a range of propositions that went from official agreement to reality shows, theatre and role plays. The outcomes of this session reflected blocking situations such as:

- Hierarchy and disconnection between groundwater users.
- The difficult connection between political mandates, economical needs, and ecological strategies.
- The asymmetrical link between a global and local challenges and demand
- Stakeholders' uneven parts of responsibility and capacities.

All the pieces produced by participants will be analysed by UNESCO-PCCP in order to better understand ambitions, obstacles, and raise converging and diverging points. Such analysis will serve as reference material to a workshop that will be held during the STAS stakeholder consultation meeting in order to provide new dimensions for the process of negotiations.

Figure 2 - Participants of the 4th Stampriet Transboundary Aquifer System (STAS) Regional Technical Workshop

8. International Water Law Training (Day 4)

Day 4 of the workshop was devoted to training in international water law, including linkages with national water law, and implementation of national water legislation. The first module, on international water law, was delivered by Dr F. Sindico, of the University of Strathclyde. The second module, on interactions between international and national water law, and on the implementation of national water legislation, was delivered by Mr. S. Burchi, UNESCO water law consultant.

In the first part of his module, Dr Sindico introduced participants to the history and development of international water law, both in its application to transboundary surface water and transboundary aquifers.

Dr Sindico highlighted the main instruments that have shaped the framework of international water law (i.e. UNWC, UNECE Water Convention, United Nations International Law Commission (UNILC) Draft Articles on the Law of Transboundary Aquifers, and the UNECE Model Provisions on Transboundary Groundwater), as well as their relationship.

The 1997 United Nations Watercourses Convention (UNWC) seeks to ensure the development, conservation, management and protection of international watercourses and the promotion of their optimal and sustainable utilization. The Convention was negotiated over the course of almost 30 years by the United Nations International Law Commission and subsequently adopted by the United

Nations General Assembly. An international campaign, led by the World Wide Fund for Nature, in cooperation with many partners, has greatly contributed to its entry into force in August 2014 (www.unwatercoursesconvention.org). The UNWC has limited consideration of groundwater as only transboundary surface water (international watercourse) connected to groundwater with common terminus is taken into consideration. Therefore, it excludes a great number of Transboundary Aquifers.

The UNECE Water Convention (www.unece.org/env/water) is a pan-european legal instrument, but covers all groundwater "which mark, cross or are located on boundaries between two or more States". The UNECE Water Convention, in force since 1996, has been the key framework instrument governing the management of transboundary water resources in the pan-European region. The implementation of the Convention has made a great difference on the ground and has led to significant improvement in transboundary water management in the UNECE region, making it the most advanced in this respect worldwide. Building on the successes achieved, the Parties to the Convention amended it in 2003 to open it up to all Member States of the United Nations. The amendments entered into force on 6 February 2013. It is expected that non-UNECE countries will be able to accede to this instrument as of end 2015.

The two Conventions are fully compatible and complementary. For example, the UNWC details factors for equitable and reasonable water resources utilization while the UNECE Water Convention prescribes the content of transboundary water agreements and the tasks of joint institutions for transboundary water cooperation. There are also some differences between the two Conventions, most notably with regard to the provision of an institutional framework. The UNECE Water Convention has a governing body — the Meeting of the Parties — and subsidiary bodies supported by the UNECE secretariat, whereas no such framework is envisaged in the UNWC.

Parties to the UNECE Water Convention developed a study on the specific application of the Convention's principles to transboundary groundwater. Subsequently, they decided to further support progress towards achieving improved cooperation by developing Model Provisions on Transboundary Groundwaters. The Model Provisions on Transboundary Groundwaters—and their commentary—provide specific non-binding guidance for the implementation of the Convention with regard to groundwater and facilitating the application of the principles of the Convention to transboundary groundwaters. They aim to improve transboundary water cooperation with regard to groundwater and strengthen integrated management of transboundary surface waters and groundwaters.

In 2002, the United Nations International Law Commission (UNILC) started working on the topic of "shared" natural resources" transboundary groundwater, oil and gas. In 2003, the UNILC drops oil and gas, and focuses only on transboundary "aquifers". Efforts resulted in the the formulation of the nineteen Draft Articles on the Law of Transboundary Aquifers (Draft Articles) prepared by the UNILC's Drafting Committee, adopted in 2008. In 2011, the UN General Assembly adopted the Resolution 63/124 recommending "the States concerned to make appropriate bilateral or regional arrangements for the proper management of their transboundary aquifers, taking into account the provisions of the draft articles annexed to its resolution 63/124." In 2013, the UN General Assembly adopted another Resolution on the Law of Transboundary Aquifers. This Resolution points out that "the draft articles on the law of transboundary aquifers have been taken into account in relevant

instruments such as the Guarani Aquifer Agreement signed by Argentina, Brazil, Paraguay and Uruguay on 2 August 2010, and the Model Provisions on Transboundary Groundwaters adopted by the sixth Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes on 29 November 2012." The Resolution further encourages States to take into account "the draft articles on the law of transboundary aquifers annexed to the present resolution as guidance for bilateral or regional agreements and arrangements for the proper management of transboundary aquifers." The scope of the Draft Articles includes activities other than the utilization of the resource "that have or are likely to have an impact upon those aquifers and aquifer systems." Additionally, it is not limited to any specific type of aquifer; all transboundary ground water resources are included in the scope of these Articles.

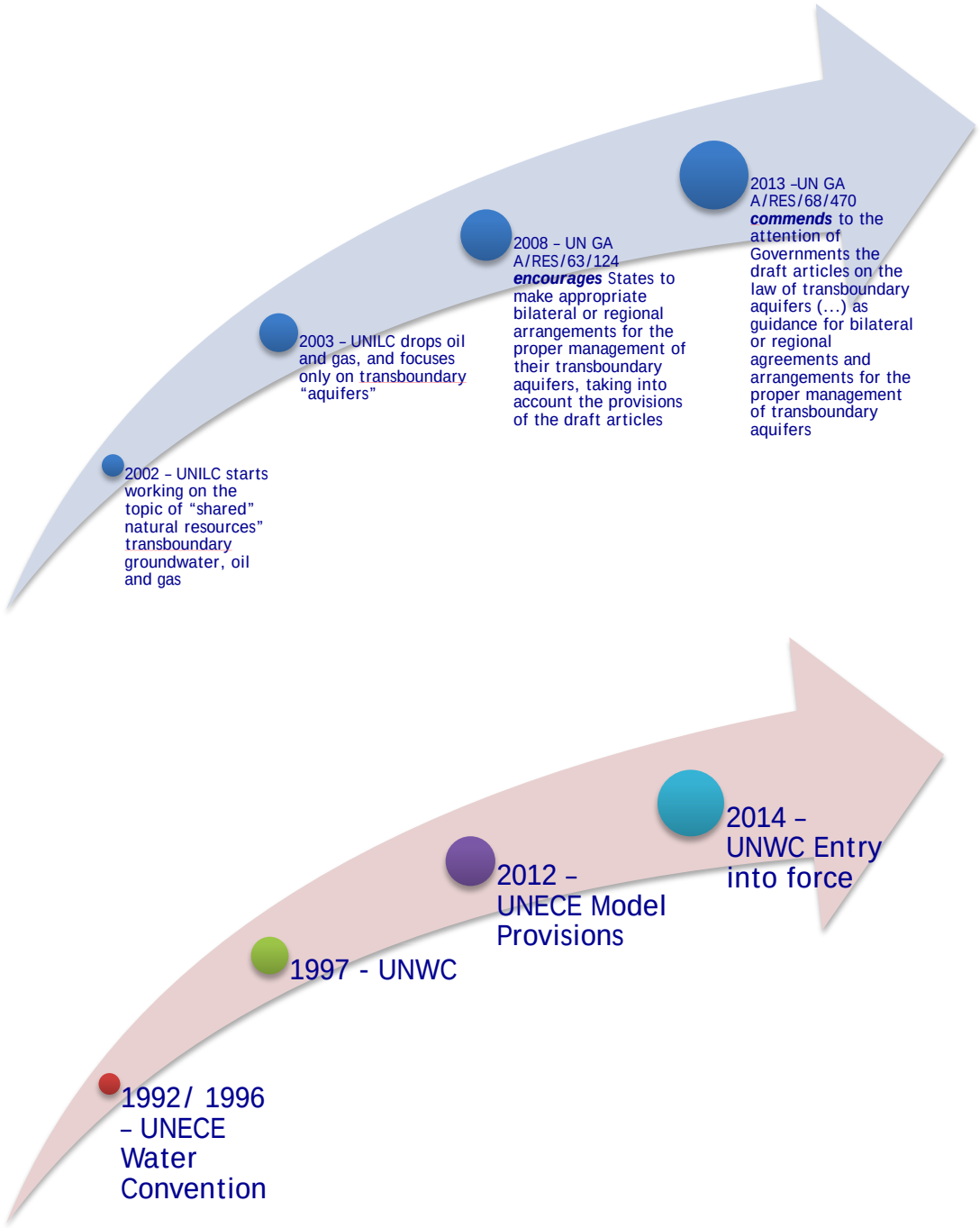

Figure 3 – Recent history and development of international water law

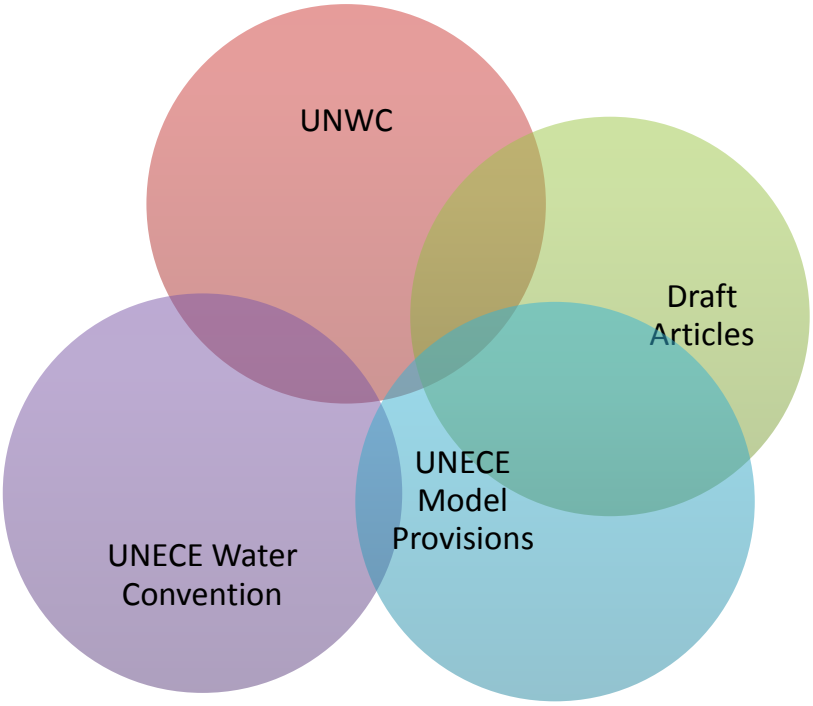

Figure 4 – Legal instruments applicable to Transboundary Aquifers

In the second part of the morning participants, a group exercise enabled further interaction and discussion and also allowed participants to raise and debate issues closer to the SADC transboundary surface water context and reality. Before doing so, a case study from Latin America (Guarani Aquifer Agreement) introduced the participants to the implementation and enforcement angles of the law applicable to transboundary surface water and transboundary aquifers.

After being exposed to the principles and practice of international water law in the morning, Mr. Burchi presented to participants the linkages between international water law and domestic water legislation in the afternoon. He started the afternoon training by presenting the issues that Mexico had to face in the implementation of its domestic water legislation on the ground. Mr. Burchi then made a review of issues of domestic compliance with transboundary water-related obligations (in particular in regard to water resources allocation and to water pollution control), stemming in particular from the 2000 SADC Revised Protocol and the 2002 Incomaputo Trilateral Agreement (Mozambique, South Africa and Swaziland).

Very positive feedback on the international water law training was given from the participants as they expressed that the training allowed them to get a good grasp of the legal underpinnings of the management of water resources at the transboundary level, including compliance and the implementation of national water legislation.

Figure 5 – Participants at the International Water Law training

Annex 1 – Final Agenda

United Nations Educational, Scientific and Cultural Organization · International Hydrological Programme

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Groundwater Resources Governance in Transboundary Aquifers (GGRETA Project)

Stampriet Transboundary Aquifer System Case Study

FOURTH REGIONAL TECHNICAL WORKSHOP

AND

INTERNATIONAL WATER LAW TRAINING

Gaborone, Botswana

5-8 May 2015

FINAL AGENDA

DAY 1 • Fourth Regional Technical Workshop, Tuesday, 5 May 2015

Objectives:

- **To present and discuss the results of the integrated assessment of the Stampriet Transboundary Aquifer System (STAS)**

9:00-10:00	Opening Session	Chair: Mr Piet Kenabatho, Regional Assessment Coordinator
	Welcome remarks from the Ministry of Minerals, Energy and Water Resources (MMEWR) of Botswana	Mr Peloteshweu Phofuetsile, Deputy Director, Department of Water Affairs, Botswana
	Welcome remarks from UNESCO-IHP	Mr Andrew Ross, GGRETA Project Coordinator, UNESCO- IHP France

	Participants round-table presentation and adoption of the agenda	
10:00-10:30	**Coffee break**	
10:30-17:00	**Integrated assessment of the Stampriet Transboundary Aquifer System (STAS)**	**Chair: Mr Tales Carvalho Resende, UNESCO-IHP, France**
10:30-11:00	Overview of the integrated assessment of the Stampriet Transboundary Aquifer System (STAS)	o Mr Andrew Ross, GGRETA Project Coordinator UNESCO-IHP, France o Mr Piet Kenabatho, Regional Assessment Coordinator
11:00-11:30	Overview of the state of the aquifer hydrogeological aspects	Prof Jürgen Kirchner, Regional Project Coordinator
11:30-12:30	Discussion	
12:30-14:00	**Lunch**	
14:00-14:30	Overview of the state of the aquifer socioeconomic and environmental aspects	Mr Piet Kenabatho, Regional Assessment Coordinator
14:30-15:30	Discussion	
15:30-15:45	**Coffee break**	
15:30-16:00	Overview of the state of the aquifer - legal and institutional setting	Ms Viviane Kinyaga, Ministry of Agriculture, Water Affairs and Forestry, Namibia
16:00-17:00	Discussion	

DAY 2 • Fourth Regional Technical Workshop, Wednesday 6 May 2015

Objectives:

- **To present and discuss the results of the integrated assessment of the Stampriet Transboundary Aquifer System (STAS) – cont'd.**
- **To present and discuss the impacts of natural and human development on the system and policy and institutional responses**
- **To discuss priorities for further action to improve management of the transboundary aquifer including multi-country consultation and cooperation mechanisms**

9:00-15:15	**Integrated assessment of the Stampriet Transboundary Aquifer System**	**Chair: Mr Geert-Jan Nijsten, IGRAC, The Netherlands**
9:00-9:30 *9:30-10:30*	Overview of the projections of future pressures in the STAS Discussion	Mr Tales Carvalho Resende, UNESCO-IHP, France
10:30-10:45	**Coffee break**	
10:45-11:30 *11:30-12:15* *12:15-13:00*	Overview of the legal and institutional responses - transboundary and national Overview of the legal and institutional responses - transboundary and national Discussion	Mr Stefano Burchi, GGRETA project legal expert Mr Piet Kenabatho, Regional Assessment Coordinator
12:45-14:30	**Lunch**	
14:30-15:30	**Demonstration of the Information Management System (IMS)**	**Chair: Mr Piet Kenabatho, Regional Assessment Coordinator**
14:30-15:00 *15:00-15:30*	Demonstration of the project Information Management System (IMS) Discussion	Mr Geert Jan Nijsten, IGRAC, The Netherlands
15:30-15:45	**Coffee break**	

DAY 3 • Fourth Regional Technical Workshop (morning), Thursday, 7 May 2015

Objective:

- **To agree on workplan for follow-up on the integrated assessment of the Stampriet Transboundary Aquifer System (STAS)**

9:00-12:00	**Options for Multi-Country Consultation Mechanism (MCCM)**	**Chair: Mr Andrew Ross, GGRETA Project Coordinator, UNESCO-IHP, France**
9:00-10:30	Overview of options for a Multi-Country Consultation Mechanism (MCCM) Discussion	Mr Stefano Burchi, GGRETA project legal expert
10:30-10:45	**Coffee break**	
10:45-12:00	**Workplan for follow-up to the integrated aquifer assessment**	**Chair: Mr Piet Kenabatho, Regional Assessment Coordinator**
10:45-12:00	Workplan for follow-up to the integrated aquifer assessment : - *Adoption of workplan for follow-up to integrated aquifer assessment* - *Plan for stakeholder consultation* - *Prospects for a further phase of the project and* Discussion	Mr Andrew Ross, GGRETA Project Coordinator, UNESCO-IHP, France
12:00-12:40	**Closing remarks**	**Chair: Mr Tales Carvalho Resende, UNESCO-IHP, France**
12:00-12:10 *12:10-12:20*	Closing remarks from UNESCO-IHP Closing remarks from Botswana	Mr Andrew Ross, GGRETA Project Coordinator, UNESCO- IHP France Mr Peloteshweu Phofuetsile, Deputy Director, Department of Water Affairs, Botswana
12:40-14:00	**Lunch**	

DAY 3 • Water Cooperation session (afternoon), Thursday, 7 May 2015

Objective:

- **Presentation of the UNECE Water Convention**
- **Provide a workshop on Enhanced negotiation skills and dispute resolution which will:**
  - **allow a platform for multilevel and interdisciplinary dialogue under the neutral umbrella of science;**
  - **introduce the outline of the "Hydrodiplomacy Capacity and Skills Enhancement" toolkit and its methodology.**

14:00-14:10	**Opening remarks**	**Chair: Mr Andrew Ross, GGRETA project coordinator, UNESCO-IHP, France**
14:00-14:10	Welcome remarks from UNESCO-IHP	Mr Tales Carvalho Resende, UNESCO-IHP, France
14:10-15:45	**Presentation of the UNECE Water Convention**	**Chair: Mr Tales Carvalho Resende, UNESCO-IHP, France**
14:10-14:45	Presentation of the UNECE Water Convention: - The UNECE Water Convention: history, main principles and obligations - Relationship with the UN Watercourses Convention - The UNECE Water Convention and transboundary groundwaters	Mr Alistair Rieu-Clarke, Centre for Water Law, Policy and Science, University of Dundee
14:45-15:15	How the Convention supports transboundary water cooperation on the ground - a country perspective - Institutional framework - Programme of work - Focus on the identification, assessment and communication of benefits of transboundary water cooperation	Mr Harry Liiv, Deputy Secretary General, Ministry of the Environment of Estonia Member of the Bureau
15:15-15:45	Discussion	
15:45-16:00	Coffee break	
16:00-18:00	**Workshop on enhanced negotiation skills and dispute resolution**	**Chair: Mr Andrew Ross, GGRETA project coordinator, UNESCO-IHP,**

		France
16:00-16:10 *16:10-18:00*	Presentation: "Hydrodiplomacy Capacity and Skills Enhancement" Group exercise: Cartography of water stakeholders through multilevel and interdisciplinary dialogue	Mr Ralph Mahfoud, UNESCO PCCP, (From Potential Conflict to Cooperation Potential), France
18:00-18:10	**Closing remarks**	**Chair: Mr Tales Carvalho Resende, UNESCO-IHP, France**

DAY 4 • International Water Law Training, Friday, 8 May 2015

Objectives:

- **Provide training in international water law (including national water law) by presenting principles and the practice of law as it applies to water resources.**
- **The training will map out and assess the state of international water law, and it will address compliance by teasing out the linkages between international legal obligations and domestic water legislation. As a result, participants:**
  - **will be exposed to:**
    - **the principles and practice of international water law;**
    - **linkages between international water law and domestic water legislation;**
    - **issues of domestic compliance with international water-related obligations;**
    - **the implementation of domestic water legislation on the ground**
    - **the development of dispute resolution and negotiation skills in a transboundary context**
  - **will get a good grasp of the legal underpinnings of the management of water resources at the transboundary level, including compliance and the implementation of national water legislation.**

9:00-9:30	**Opening Session**	**Chair: Dr Piet Kenabatho, Regional Assessment Coordinator**
9:00-9:10 *9:10-9:30*	Welcome remarks from the Botswanan Ministry of Minerals, Energy and Water Resources (MMEWR) Presentation of the program and structure of the International Water Law training: setting up the legal and	Mr Peloteshweu Phofuetsile, Deputy Director, Department of Water Affairs, Botswana Mr Stefano Burchi, GGRETA Project Legal Expert

	institutional framework - international and domestic perspectives.	
9:30-13:00	**International Water Law**	**Chair: Mr Tales Carvalho Resende, UNESCO-IHP, France**
9:30-10:00 *10:00-10:15* *10:15–10:30* *10:30-11:00*	Transboundary Surface Water Law and Transboundary Aquifer Law Principle of equitable and reasonable utilisation Overview of procedural obligations Debate and Questions and Answers	Dr Francesco Sindico, Director, Strathclyde Centre for Environmental Law and Governance, University of Strathclyde, Scotland
11:00-11:15	Coffee break	
11: 15-11:45 *11:45-12:45* *12:45-13:00*	Case Study: Guarani Aquifer Agreement, Institutions and Dispute Settlement Group Exercise Conclusion *Reference material:* - *United Nations Watercourses Convention* - *UNECE Water Convention* - *UNILC Draft Articles on the Law of Transboundary Aquifers:* - *UNECE Model Provisions on Transboundary Groundwater* - *Agreement on the Guarani Aquifer* - *Treaty of the River Plata Basin* - *Agreement on the Establishment of the Zambesi Watercourse Convention* - *Agreement on the Establishment of the Orange-Senqu River Commission* - *Tripartite interim agreement for co-operation on the protection and sustainable utilization of the water resources of the Incomati*	

	and Maputo Watercourses - *Agreement on the Establishment of the Limpopo CommissionSADC Revised Protocol on Shared Watercourses* - *Groundwater in international law by Stefano Burchi and Kerstin Mechlem*	
13:00-14:00	**Lunch**	
14:00-17:00	**Links between international water treaties and institutions and national water laws/implementation of national water laws**	**Chair: Mr Andrew Ross, GGRETA project coordinator, UNESCO-IHP, France**
14:00-14:45 *14:45-15:30*	Links between international laws and institutions and national laws Implementation of National Law: - Institutions, - Administration, - Regulations, - Enforcement *Reference material:* - *Water Rights Administration - Experience, Issues and Guidelines by Hector Garduño Velasco*	Mr Stefano Burchi, GGRETA Project Legal Expert
15:30-16:00	Coffee break	
16:00-17:00	Q&A and Discussion	
17:00-17:30	**Closing remarks**	**Chair: Mr Andrew Ross, GGRETA project coordinator, UNESCO-IHP, France**

Annex 2 – Final List of Participants

Groundwater Resources Governancein Transboundary Aquifers (GGRETA Project)

Stampriet Transboundary Aquifer System Case Study

CONTACT DETAILS

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9	**Ms Kholeka Moilwa**	Botswana National Commission for UNESCO	Executive Manager	kmmoilwa@gov.bw
10	**Mr Katlego Bagwasi**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources		

		(MMEWR)		
11	**Ms Elisha Toteng**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
12	**Mr Namu Mangisi**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
13	**Mr Cornelius Gaconale**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
14	**Mr Charles Nkile**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
15	**Ms Kelly Gaboiphiwe**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
16	**Mr Lefoko Senatla**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources		

		(MMEWR)		
17	**Mr Force Ramasuswana**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
18	**Mr Tebusu Masaka**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
19	**Mr Tefo Lobelo**	Department of Water Affairs, Ministry of Minerals, Energy and Water Resources (MMEWR)		
20	**Ms Pulane Mswela**	University of Botswana		
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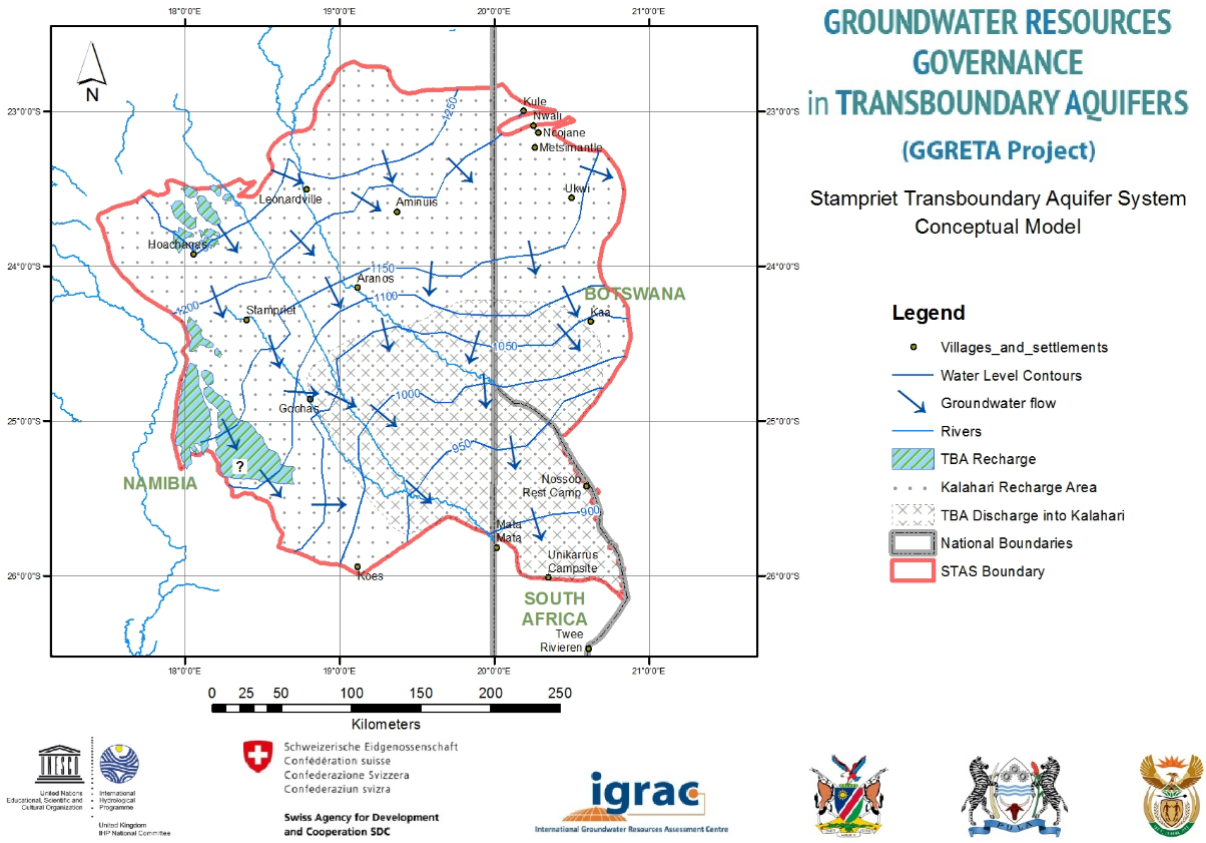
Annex 3 – Revised structure and content of the integrated assessment report of the STAS

Chapter	Contents and narrative	Maps	Other representations (e.g. graphs and tables)
Executive Summary			
1. Introduction	1. Presentation of GGRETA project: origins, objectives, methods and partners 2. Presentation of STAS case study: objectives, scope, partners 3. Presentation of the integrated assessment of the STAS: design, implementation	• Base map (STAS delineation, administrative units, national borders, population centers, rivers, roads, broad scale land uses	
2. Hydrogeology	1. Overview description of the STAS (geology and hydrogeology) 2. Conceptual model of the STAS (recharge and discharge areas, groundwater flows) 3. Recommendations and conclusions	• STAS delineation • Annual rainfall and temperature in the STAS • STAS conceptual model • STAS cross-sections	• Groundwater mass changes using GRACE observations
3. Socioeconomic and environmental	1. Human population distribution in the STAS area 2. Groundwater availability and use in the STAS area 3. Groundwater quality (suitability of groundwater for different uses (human/domestic, livestock, irrigation) and future trends 4. Groundwater pollution in the STAS area (types,	• Human population distribution • Land use map • Groundwater quality (fluoride, nitrate, sulfate, and TDS) • Groundwater vulnerability - potential pollution (point and block	• Tabular presentation of population; total and by country • Population growth by country (graph, time series)

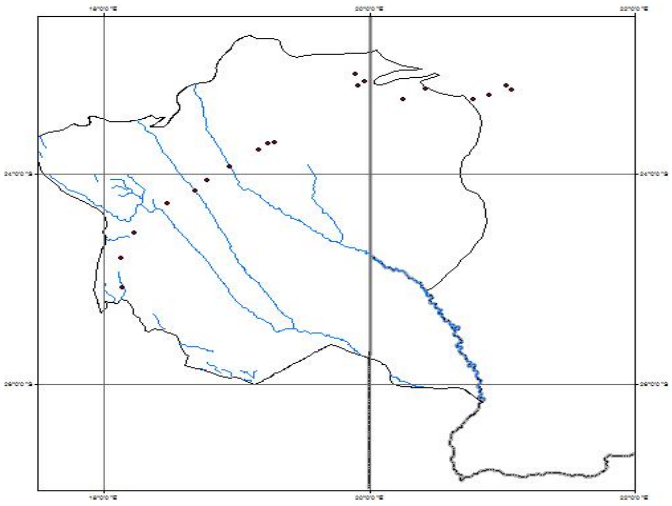
	sources, levels/intensities) 5. Percentage of population covered by public water and sanitation 6. Recommendations and conclusions	estimates of pollution sources and sites, including wastewater and waste)	
4. Legal and institutional	1. Status and assessment of the transboundary legal and institutional framework of relevance to the STAS (including relevant legal instruments) 2. Analysis and assessment of the relevance of the selected legal instruments to the STAS 3. Analyses and assessment of the relevance of the existing institutional arrangements to the STAS 4. Status and assessment of the domestic legal and institutional frameworks of the relevance to the STAS (Botswana, Namibia and South Africa) 5. Conclusions		
5. Contemporary Policy and Management issues and possible responses	1. General Observations regarding the STAS 2. Current policy and management issues (including data deficits, groundwater pollution, implementation of law and policy, possible policy and management responses at national and multi-country level, possible practical examples of responses)		
6. Legal and	1. Legal and institutional		

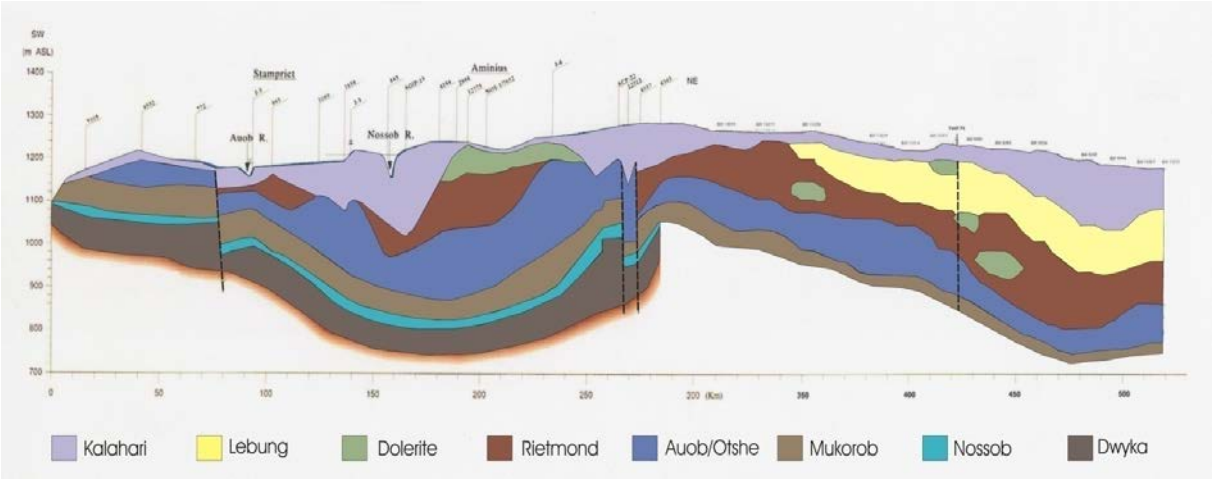
institutional responses	responses at transboundary level 2. Legal and institutional responses at the domestic level of the STAS countries 3. Pointers for a long-term domestic-level legal and institutional response strategy 4. Concluding remarks		
7 Options for Multi-country Consultation and Cooperation Mechanisms (MCCM)	1. Objectives of a multi-country consultation mechanism for STAS 2. Overview of Options for a MCCM (including core tasks, structure, legal arrangements and clarifications, funding arrangements, advantages, disadvantages)		

Annex 4 – Geo-referenced boundary and conceptual model of the STAS



Annex 5: WSW-ENE cross-section - Stampriet-Ncojane





Annex 6: Organigram of Multi-Country Consultation Mechanism option 1 (Coordinating STAS Committee)