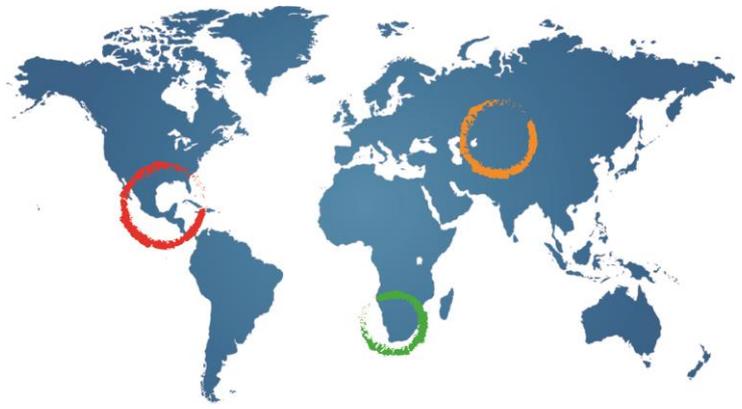


**GROUNDWATER RESOURCES
GOVERNANCE
in TRANSBOUNDARY AQUIFERS
(GGRETA Project)**



**2nd STAMPRIET AQUIFER ASSESSMENT
STAKEHOLDER CONSULTATION MEETING**

25-26 November 2015

Kalahari Anib Lodge

Minutes of the meeting



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1. Opening, welcoming remarks and agenda

The workshop was officially opened by Youssef Filani-Meknassi from UNESCO office Windhoek, participants were welcomed and the heads of delegation of each country were invited to give welcoming remarks.

- Namibia: delivered by Maria Amakali from Ministry of Agriculture, Water and Forestry on behalf of PS Mr Abraham Nehemia, highlighting the importance of the Stampriet aquifer for the livelihood of people; for this, sustainable management is required;
- Botswana: Mr. Phofuetsile from Water Affairs delivered welcoming remarks on behalf of Dr. Obakeng; Botswana welcomes the project and is keen on shared water resources management and collaboration; Botswana uses groundwater to 70-75% so is highly depending on groundwater, and is currently experiencing a serious shortage of water; at the same time it experiences difficulties getting donor funds since Btw is classified as middle income country; water is critical for life and for all sectors.
- South Africa: Ms Deborah Mochothli, Department of Water and Sanitation: project comes at right time, when countries are affected by drought not only on country level but as a region experiencing low dam levels and little water availability; current water scarcity makes people aware of its importance; South Africa uses to 75% surface water, little ground water is used but is not of less importance; current attempts of desalination of sea water turn out to be expensive while ground water use is less expensive; the national development plan is under development now, and acknowledges that RSA will go nowhere without water; appreciate capacity coming out of this project and the information that are delivered.
- Project leader T. Carvalho Resende welcomed everybody and highlighted the excitement of being on top of aquifer; importance of sharing information and stakeholder consultations;
 - Presented objectives:
 - o Raise awareness and promote transboundary aquifer management cooperation in Southern Africa;
 - o Share the results of the STAS assessment with a broader audience;
 - o Receive feedback of the STAS assessment;
 - o Discuss on a plan for further work on the STAS.
 - Introduced agenda
 - o Agenda day 1:
 - Presentation of the STAS assessment results;
 - Presentation of the Information Management System;
 - Discussion / Reactions on the results of the STAS assessment.
 - o Agenda day 2:
 - Consensus-building workshop;
 - Update and discussion on a plan for further work for Phase 2 of the project;
 - Field visit (after lunch).
 - Requested participants to introduce themselves .

2. Presentations and discussions

2.1 Context: ISARM – TWAP – GGRETA 2013-15

- GGRETA comes from Unesco's leading role for transboundary groundwater governance;
- Started with an assessment of all transboundary aquifers worldwide (166), only 5 with legal transboundary agreements;
- Stampriet one of three case studies (one in Africa, one in South America, one in **Russia**);
- Aim is to achieve sustainable management and establishment of a multilateral management mechanism;
- Expected outputs of GGRETA are:
 - o A detailed assessment of the current conditions of the aquifers, including a diagnostic of transboundary concerns, conducted with the full participation of national experts;
 - o A database and IMS for field data storage and elaboration, established for each aquifer;
 - o Sustainable management of transboundary aquifers (TBAs) ;
 - o Enhanced awareness of International Water Law.
- Structure used: Government representatives, national coordinator, technical experts (legal and institutional, socio-economic, hydrology).
- Progress: since 2013 5 regional workshops, 2 stakeholder consultation, field visits.

2.2 Findings of the STAS assessment

Presentation delivered by Tales Carvalho Resende

Presentation "Area":

- Area 86647 sqkm , 19% in Btw, 8 % in RSA, 73% in Namibia;
- Delineated study area along Ecça Group within Auob and Nossob river basin;
- In Namibia a total of 1200 farms, with commercial farmers, resettlement and new farmers, partly with irrigation schemes (lucerms, water melons, tomatoes, beans...);
- Btw and RSA mainly national parks with buffer zone for wildlife management with some settlement areas in Btw;
- Population estimate with 45 000 largest share in Namibia;
- Rainfall erratic with sometimes very high incidences;
- Evaporation high, increase in average temperature with increase of interannual variability;
- El niño and el niña events high influence climate variability; impact is critical, requires further research;
- Coincide of el niño with little rainfall followed by el niña with good rainfall.

Comments/questions and answers to the presentation part "Area":

- *Conclusions on el niño and el niña based on research which is not published yet;*
- *water exports from the STAS maybe likely as heard in opening remarks: even if not physically connected but socio-economic aspects are relevant for countries;*

- *Maria/Namibia: ORASECOM suggests to consider connections to Orange river even if rivers do not flow for several years; they are still physically connected and relevant to consider (comment from Britta: this is in contradiction with input presentation that STAS is not hydraulically connected to Orange river!);*
- *Geert: Increased annual variability requires careful approach to transcribe results; STAS area has always had large variability, which is not uncommon and people are to an extent used to deal with high variability;*
- *Joyce: No settlement within RSA in STAS; Mier outside STAS, RSA confirms;*
- *Geert: STAS area defined by geology, not by administrative boundaries;*
- *Mr Phofuetsile: Climate change variability? Conclusion on trends but not firm statements, IPCC data important;*
- *6 rainfall stations in surroundings of STAS, most of time only 2 station operational within the area; best data from Twee Rivieren, as long term data collection done since 1970s;*
- *Mean monthly data are used to generate mean annual temperature and rainfall, but is difficult to get reliable longterm data.*

Continue presentation: “Overview on STAS”

- STAS is a system of unconfined aquifers (Kalahari) which are loosely connected with 2 confined aquifers (Auob and Nossob);
- Kalahari aquifer not transboundary;
- Unconfined: Auob and Nossob transboundary;
- Initial assumption that no borehole in RSA is tapping into Auob aquifer but assumption wrong;
- Kalahari and Auob have highest exploitable potential, Nossob lowest potential;
- Country recommendations are to treat aquifers separately;
- Recharge little, mainly in Kalahari aquifer, in others almost non-existent;
- Groundwater flow from NW to SE; saltblock in Kalahari aquifer.

Comments/questions and answers to the presentation part ‘Overview on STAS’:

- *Joyce: Question on permeability of aquifers? Clarification on geology, none-transboundary character of some aquifers needs to be considered; there is no clarity on discharge mechanism but some observations of poor water quality, upward flow and place of previous erosion result lead to assumption of flow of water into other layers (Geert);*
- *Kirsten: the term “periodic” might be more appropriate than “almost no existent” for recharge: Tales relates to normal years (average rainfall); however there is hardly a “normal” year in STAS; how justified is an average considering the high variability? Geert: figures of average easier to understand; recharge as percentage of rainfall does not mean much, more meaningful would be a figure on the absolute volume per year under different conditions; Tales: very difficult to give an exact recharge rate, as depending much on rainfall; distinction between low and heavy rainfall years;*
- *Mr. Sekwele: geology not really well understood and hence based on assumptions; Tales: overestimation of the exploitable resources? Method of the Matsheng report applied for STAS; use percentage of estimate water reserve, use 20% of reserve to be exploitable;*

- *Discharge: rephrase discharge of Kalahari aquifer; Joyce not fully convinced, suggested to use indication instead of thorough statement;*
- *Geert: warning of Kirchner that water is an exploitable reserve; Matheng report was done to the best of expert's knowledge; but artesian layers under high pressure, hence assumptions may not be correct to be applied in order to calculate the exploitable amount; developing policies based on wrong assumptions is very risky!*

Conceptual model:

- Treating layers separately as per country recommendations;
- Recharge occurs not throughout whole area of aquifer, discharge meant to be evapotranspiration;
- Recharge zones close of Hoachanas and Gochas;
- Groundwater flow pattern NW-SE, higher water levels in Nam, low in RSA (and Btw);
- Discharge in central/southern areas.

The role of groundwater in area:

- Biggest achievement is to have built joint borehole database;
- 6167 recorded boreholes, 95% in Nam, 2 in RSA and 3 in Btw;
- of 16% known into which aquifer the boreholes are tapping in;
- 80% boreholes are in use.

Comments/questions and answers to the presentation part "Conceptual model" and "role of groundwater in the area":

- *Recommendations to remove the boreholes outside the STAS area and stick only use the ones inside; however boundaries are not entirely known so not really sure if boreholes are inside or outside; especially since delineation of three layers a bit difficult, hence individual delineation of layers suggested; this is the challenge that is reflected in the map; extent of Kalahari aquifer different from others;*
- *Assumption was based on Auob and Kalahari aquifer; Kalahari aquifer should not be taken into account since it is the one that is not transboundary but has a huge socio-economic impact; current delineation was based on Eccca group;*
- *Spatial trends are used where people are using shallow and deep waters; is there any experience from users why they are using which aquifers in which are? Quality? Accessibility? What are reasons for this specific distribution? Farmer Jaco Kotze: Not everyone is given permission, which is needed to drill into deep aquifers; rest of boreholes is for animal use; lucky if you get permission to drill into artesian wells; this is found around Stampriet and Gochas along the river valley; drilling into artesian aquifer outside these lines can be very costly; south of that line deep water is very brackish, whereas water in Stampriet area is very good; last test results were fantastic considering it is ground water; water quality map can also provide some information about the uses;*
- *Socio-economic aspects outside STAS; utilisation of these boreholes? Tales: water transfer scheme in Btw.*

Continue presentation: “Groundwater level monitoring”

- Long term data difficult to find, extrapolation allowed however some conclusions;
- Falling water tables in Kalahari and Auob aquifers from early to late 90s, then extreme rainfall in 2000, which restored water levels; Nossob aquifer remained relatively stable;
- Longterm observation: groundwater tables relatively stable but slightly falling with rapid increase after rainfalls;
- Most years contribute little or nothing, exceptional rainfall replenish system for a couple of years; over 35 years 3 recharge events (exceptional rainfall coincides with la niña, after el nino); el niño/el niña seems to have highly influence (2015 el niño biggest that ever occurred); further research required to understand el niño/el niña impact on STAS;
- Volumes: annual 20 Mio m³, abstraction 97% in Nam with relatively stable abstraction rate;
- Abstraction per aquifer mostly from Kalahari with 65%; mostly for irrigation 52%; this covers the whole STAS, not per country but obviously driven by Namibia with 97% of abstraction;
- Profits of groundwater use:
 - 1200 farms, mostly in Namibia, 300 new farmers;
 - 110 farms using water for both livestock and irrigation, 80 farms depend only irrigation farming with a total of 610 ha irrigated farmland;
 - Livestock: small stock 1.2 mio, 110.000 cattle(?); stocks are now high with lots of cattle which had not been there before good rainfalls (sheep are not grazing enough);
 - Employment; 4000 jobs related to irrigation and livestock farming (4000 livestock, 700 irrigation, 600 jobs other kind of employment like lodges).

Comments/questions and answers to the presentation part “Groundwater level monitoring”

- *Geert questions on el niño/el niña: Tales: after el niño a la niña event, but strong el niño does not necessarily mean that there is an el niña event; Kirstin; el niño every 7 years, but not recharge after 7 years – what is message? Only a very strong el nino **might** result in a recharge, but not necessarily*
- *Farmers brought lots of cattle in 2000 (which is not a good idea in the long term but was right at that time); stock are being sold right now since they cannot be sustained;*
- *Data collection done where? In all countries but mostly informed by Namibia; Btw a bit difficult to get data since it lies in two districts (Ganzhi and Kalahari north?) which are huge districts, hence figures for STAS a bit hypothetic as it is difficult get precise data for STAS only; agricultural census currently carried out with new data to be published; data are broken down in smaller areas;*
- *Allocated volumes available? Yes;*
- *Irrigation farms 80 with 610 ha, 50% vegetables (no data from Ghanzi area; difficult to get, but expansion and diversification done in this area right now; should be captured in the new agricultural data) ; percentage in respect of area, not in terms of volumes or prices;*
- *Lucerns mainly grown in Namibia; in which areas? Tales needs to check; land use map might be useful to get information where uses are located;*

- *Geert suggests creating a graph to show information in three different ways: area, water use and profits generated with this crops; this could lead to a tool informing people how to make better use of resources and land. Question is if all these figures are available? JICA report could have information from 2002, whilst the amount how much water is used for which crop might not have changed; however income generation figures will be a bit more difficult to get; lucerne production to large extent for feeding own livestock;*
- *Britta: Agronomic board of Namibia is about to publish new figures related to volumes and income generated from vegetables etc., awaiting more information from them;*
- *Collective use of subsistence farmers – differentiate domestic and commercial use!*

Continue presentation: “Tourism in area”

- 10 lodges, each 10-15 rooms;
- Kgalagadi park (name translates “thirstland’), 40 000 visitors per year, 10 tourist facilities in RSA, in Btw only campsites ;
- Land restitution program in RSA (Mier community); potential for redistribution of revenues of entrance fees to the communities.

Comments/questions and answers to the presentation part “Tourism in area”

- *Recommendation to make an effort to link figures to water use and to income – what is the income per m³ in respect of the water use? Does this include the number of staffs per facility in Kgalagadi transfrontier park?*
- *Caution: do not mix the two communities Mier and Hamana, to be distinguished and not grouped together, since one community is a San community, the other one not; claims differ!*

Continue presentation: “Ground water quality”

- Kalahari aquifer in Namibia good quality, in Btw and RSA decreasing quality; explains interest of Btw to go into deep aquifers;
- Auob and Nossob: good quality throughout Northern area, decreases as from saltblock area in the central-southern part;
- Conclusions: quality decreases towards South;
- Suitability check for human consumption/livestock consumption determined by the TDS (Total Desolved Solids) levels etc; cut-off thresholds for TDS were discussed in previous meetings)
- Pollution vulnerability at this current level is negligible, but TDS has increased by 10 % in 3 years with localised potential sources of pollution close to settlements; special attention needs to be given to irrigation boreholes along Auob and Nossob rivers; recharge zones in Namibia to be addressed.

Comments/questions and answers to the presentation part “Ground water quality”

- *Jaco Kotze: Cleaning of water troughs every couple of days, 2-3 times a week, otherwise water becomes unsuitable due to oxidation;*
- *How is negligible pollution defined, what is threshold? At what stage is it no negligible anymore? Classification of negligibility set acceptable limits in % or in concentration to qualify statement of negligibility; WHO standards were used to classify negligibility; Different in three countries but similar to WHO standards;*
- *Geert doubts if statement is true: nitrate level as well as signs of localised pollution indicate there is a risk already, so once cannot say it is negligible;*
- *Current levels of development and susceptibility to pollution are not to be mixed up – vulnerability is not only depending on development, but nature of shallow aquifers makes them higher susceptible than deeper aquifers.*

Continue presentation: “Groundwater use patterns”

- Abstraction rate not expected to much increase in the next years;
- Mathseng water transfer scheme seems acceptable but yields may reduce if pressure from pumping decreases whilst risk of TDS levels increase;
- Abstraction rate of Mathseng 9600 m³/day, plans to double this in future, 3.5 Mio m³/year.

Comments/questions and answers to the presentation part “Ground water quality”

- *Geert: does not share statement that there are no risks: population increased, so how statement that abstraction is not increased is not really credible; what if you bring in irrigation, will this statement change? Double check if data are correct;*
- *Acceptable rate? What is the qualification of this statement? Maybe environmentally not harmful? Qualify information;*
- *Water transfer scheme in Namibia, what about water use outside STAS? Is this informal, is it formal?*
- *Why would prolonged pumping impact yields if aquifers are confined? Tales to consult Kirchner who drew these conclusions; Geert: even if layers are separate, there will be always a leaking and an influx from other levels e.g from drilling; this can be observed from the decreasing quality in other aquifers;*
- *Mathseng: reported aquifers provided freshwater but then influx of saline water after a while;*
- *Transboundary nature of the Kalahari aquifer again questioned? Kalahari aquifer is indeed loosely connected to other aquifers;*
- *Maria: indirect consumption of water outside STAS e.g. consumption of vegetables but produced in this area;*
- *Issue of non-resident users: most of crops from Namibia e.g. vegetables consumed in Windhoek; livestock sold to South Africa, and Denmark; Jaco: problems to export to South Africa, own abattoirs where small stock and livestock are being slaughtered; 60% small stock slaughtered (and presumably consumed) here in Namibia; 35% goes outside the country; old regulation ratio 6-1 (slaughtered to exported) has changed to 1-1, free market with RSA sought; idea was value-adding.*

Continue presentation: “Current and potential threats”

- High water losses, e.g. in Stampriet 60% loss as percent of water supply (DWA, 2006);
- Non-optimal water use;
- Borehole leakages;
- Illegal abstraction occurs;
- Prosopis along Auob and Nossob, causing bush encroachment with high density along rivers;
- Impact on availability of fresh water in lower Nossob River, since consumption of Prosopis up to 50l/day; density increases by 18% per year, in other words doubles in 5 years.

Comments/questions and answers to the presentation part “Current and potential threats”

- *Concerted management plan for invading species Prosopis?*
 - *Namibia: No policy for Prosopis in place as such but within a project of ORASECOM idea to erase Prosopis under the Directorate of Forestry and do some value-addition; some youth groups to get material for own utilisation, UNAM study to what is impact of removing;*
 - *South Africa has program to combat invading species in general, not specifically for Prosopis;*
 - *Btw: program with USAID in Kalahari Namib in ORASECOM context; any idea to get anything in place?*
- *Prosopis is a threat to (communal) farmers, but people are reluctant to take action; **recommendation to urgently develop a joint management plan for countries acknowledging negative impacts;***
- *What is the problem about leakages? Is water not just going back into ground? Issue is that water does not go directly back but evaporates or carries pollution; if leakages are deep, then loss of good quality water on the way; often leaking water carries oil and grease etc; if water efficiency is not optimal, we need to improve;*
- *Change of land tenure pattern might have impact through high density of boreholes; highest density around Stampriet.*
-

Continue presentation: “Domestic Legal and institutional responses”

- Sources: relevant domestic groundwater legislation; implemented by administration;
- Minimum level of compatibility regarding legislation:
 - Well drilling – on track;
 - Ground water abstraction and use - on track;
 - Pollution from point sources – on track;
- Room for improvement in legislation regarding pollution and interference with natural recharge as well as administration, enforcement and implementation of legislation;
- Institutional responses: consolidation and coordination of actors are required;
- Pointers for long term strategy should focus on domestic level improvement of quality and performance of implementation but also of government administration;
- Long term mechanism: sustainable management; 2 options, either establishing a coordinating STAS committee, or using the standing ORASECOM committee.

Comments/questions and answers to the presentation part “Domestic Legal and institutional responses”

- *To what extent is the law enforced? Questionnaire covers this part, but also room for interpretation – how good is the implementation? **Recommendation to include law enforcement as an important activity for the next phase***

2.3 GGRETA Information Management System - Benefits and Demonstration

Presentation delivered by Geert-Jan Nijsten:

- Role of IGRAC in GGRETA to establish information management system for sustainable development, management and governance of groundwater;
- Definition of groundwater governance and the role of information in groundwater governance (program of GEF, www.groundwatergovernance.org);
- Highlighted importance of collective action, accurate and shared knowledge of groundwater ecosystems as well as awareness on sustainability concerns:
 - Good aquifer management requires good information, which includes snapshots of static factors and monitoring of dynamic factors;
 - Information needs to be converted to knowledge and shared with stakeholders in order for them to take informed management decisions;
 - Four tasks are key to groundwater management: data acquisition, analysis, information sharing and dissemination of knowledge important;
 - UN draft articles on the law of transboundary aquifers: article 8 regular exchange of data and information.

GGRETA IMS (Information Management System)

- Objectives are to have a support tool for governances providing access to all stakeholders as well as a system for storing, sharing and analysing project results;
- Map based web application with protected views, countries are able to control the content;
- IGRAC supports to move as much as possible to public spaces, but it is to national government to decide on user access; currently 50 maps uploaded;
- Upload of data and sharing of sensitive data only to be done within protected workspace by authorised users;
- Introduced folder structure and map view; data content, feature data, option to download feature information for re-use; create overlays; query function, interpretation of results, e.g. in respect of thresholds;
- Metadata information module: upload relevant documents and publishing of data by authorised users only;
- Changing of information is not possible by individuals, but only authorised users; currently two authorised user groups (regional coordinator and national experts) with different access rights
- System was built for GGRETA but is part of a Global Groundwater Information System GGIS (www.ggis.un-igrac.org);

- Running of software: IGRAC is in the long term committed to assist but maintenance is responsibility of countries;
- Imperative to hand over data to countries, and organise how database is maintained in future in order to keep system alive now at the end of phase 1 of the project;
- All countries to nominate someone to be responsible for maintaining system, jointly take decisions who will take charge of it in future what information can be publicly viewed.

Comments/questions and answers to the presentation “GGRETA – IMS”

- *How will future collaboration be done? How can maintenance look like in future?*
- *Ms Mochothli on behalf of RSA appreciate preparedness to hand over, but this cannot come now at phase of phase 1 – was exit factored into the project concept? Is too early, no capacity built; decision what information goes into system/public; RSA recently launched an information system; do not want to limit information to an extent where it is becoming useless; response: each country has to decide how this matches their own initiatives, how happy they are with the system etc.;*
- *Youseff: is it correct that currently access to maps is provided for but no option to download? Geert: at moment not all functions fully turned on like downloading of maps; technology provides for it but not yet agreed upon;*
- *Countries to decide on how structure of management will be taken will require further consultation within countries; Tales responds this is not an anticipated outcome of this meeting today; seems bilateral discussions necessary;*
- *Was system was not part of initial concept? It was, report contains all information in the report but is just digital information;*
- *Sekwele: Taking over of system? Decisions are still pending, although supposed to be taken a long time ago; More time needed to consult on management options, only then countries will be able to also agree on information management system related decision.*

3. Way forward and workplan

- phase 1 comes to an end; last meeting in Paris, opportunity to bring political heads and donor to together to discuss how phase 2 could look like (if there will be a phase 2);
- potential interventions were submitted by countries and prioritisation agreed upon during first stakeholder consultation meeting in July; most important interventions were:
 1. Joint data collection;
 2. Capacity building in research institutions, including modelling activities with academia;
 3. Put IMS into full operation, upload data;
 4. Do thorough scientific work, provide better estimates of annual off-take, agree on standardised approach to assess vulnerability to pollution, water quality, water treatment from saltblock region etc.;
 5. Development of borehole maintenance and recommendation and enforce compliance (legal focus);
 6. Evaluation of transboundary aquifer, economic footprint, evaluation of evasive species;
 7. Investment on water supply in remote areas;
 8. Modelling (together with number 2).

- Many issues addressed since July, now already three cross-sections, partly already fine-tuned
- For meeting on 15./16. December in Paris participants from three case studies will be invited, with presentations of all pilot studies; second day parallel sessions for three areas to discuss the final report and phase II including priority list;
- Assessment report will be finalised with much more data collected and collated; draft report will then be sent to participants for comments; schedule for finalisation of assessment report agreed (see below)
- IMS:
 - feedback needed which maps can be moved in the public view; discuss the data (which is subject to interpretation and hence more critical than the maps);
 - limitation of number of people
 - background and guiding document for data sharing and IMS maintenance to develop recommendations for political heads on nominations be sent to national coordinators
- Kirstin introduced PhD: framework for sustainable and inclusive development as an addendum to full report; if included then based on feedback and review; would go with main document, any feedback welcome.

Comments/questions and answers to the “way forward and workplan”

- *Geert: Will meeting in Paris be also used to fine-tune report from expert point of view? Tales: short time, only two weeks left, try send assessment report to national coordinators next week, feedback before December meeting (one week only!); Geert recommends to have more time after December meeting to get a good quality final report not to waste a three year project in a bad report; Youssef: no final printing of report before December meeting, huge issues can be raised before Paris meeting, but still time to fine-tune afterwards;*
- *Kirsten worked on supplementary governance structure, summary of it distributed to some people; broad recommendations based on this study could be used to provide feedback and recommendations; more sustainability focus than legal perspective;*
- *RSA: technical report to be finalised and at the same time brief political heads is very difficult; recommendations to not only invite one person to Paris in order to provide technical advice to political heads; Tales: UNESCO can invite more people now, at least three per country;*
- *RSA: parties had agreed to decide on management structure after the July meetin; now at this meeting still no responses from other countries;*
- *UNAM: to what extend will research institutions in the countries be involved, referring to priority list No. 2 and 4 which involves scientific research? No further discussion since July, after Paris meeting we will have a better picture;*
- *RSA: hydro diplomacy capacity building component? will be run by UNESCO;*
- *RSA: quality vs quantity of water (pollution vs consumption);*
 - *Tales: quantities in aquifers very difficult to estimate; identification of aquifer first, only then proper estimations can be done;*
 - *RSA priorities for phase 2 must be to focus on sustainable utilisation and equitable use of resource!*

- *Jaco: extent of aquifer not known, but prevention is better and we need to protect resource before it is too late;*
- *Deborah: focus must be sustainable availability of resource, but knowledge about resource is needed; desktop study available now, needs to be completed with additional information to fully understand it, its extend etc; this requires also to put in more resources since understanding is vital to manage it sustainably and for equitable use;*
- *Geert: issues raised in yesterday’s presentation **around IMS and its handing over (?Or on management structure?)** should to be taken to a next level; need to start thinking about possible ways to solve issues; directions and solutions should be part of the report and December discussions;*
- *Sekwele: priority list not exhaustive but we should relook at list, since priorities might have changed; Geert: shifted priorities is something to be reported to political heads during review of the report; priorities need to be re-confirmed for next phases and are maybe even more important than detail of the points; after two stakeholder meetings there is a need to re-look at or add to identified issues, rather in addition to but not as a substitute for priority list.*

Provisional workplan to conclude phase 1

4 December	Final draft report shared with country	UNESCO – Tales
11 December	Major issues reported to political heads and to UNESCO, including preliminary feedback on MCCM (which of the 2 options) and IMS data sharing	National coordinators
15./16. December	Paris meeting	Political heads and support person
22 January	Detailed comments from national experts received by UNESCO (to be submitted by nationals coordinators)	National experts to review text; National coordinators to compiles and submit to UNESCO
12 February	Report text finalised	
4 March	Report printed and distributed	

4. Workshop on water diplomacy

Ralph Mahfoud facilitated this workshop and presented an outline of context, objectives and a re-cap of previous exercises:

- What is water diplomacy and placing of program in the unesco system;
- Objectives of water diplomacy workshop:
 - UNESCO program “From Potential Conflict to Cooperation Potential” (PCCP);
 - strengthen stakeholder engagement in STAS;
 - To discuss priorities for further action to improve management and governance of the transboundary aquifer including cooperation mechanisms;
 - to discuss roles and expectations of stakeholders in cooperation mechanisms;
- GGRETA:
 - development of a toolkit for trainings and workshops for other transboundary aquifers;
 - Collection of related conflict/cooperation indicators;
 - Coordination of trust-building measure;
- Workshop in May: invent new alternatives and mechanisms; interdisciplinary exercises, stakeholder mapping, and new ways for cooperation(?) results: trust building;
- Workshop in July re-cap:
 - Focus on capacity building, new ways of water diplomacy;
 - List of stakeholders (exhaustive);
 - Model by Boulez- pointed out tension (positive and negative), draw flow of influence;
 - Highlighted results:
 - Distribution of stakeholders varies so much that it reflected the complexity of this interrelation;
 - No group talked about national borders;
 - Coordinating roles were attributed commonly to international agencies, lobbies, syndicates and association of farmers ;
 - Several tensions mentioned between academia/implementing agencies, famers/political leaders, traditional leaders /academia and media;
 - Status of audience active or passive? Legitimacy of representation;
 - Role of farmers association is to trigger action on different levels;
 - Question of inclusiveness of stakeholders?
- Phases in water diplomacy: Trust building -> Capacity building -> consensus building;
- Questions for this workshop now:
 - Who will do what with all the collected data afterwards?
 - How would you like to collaborate together?
 - What do you want to do?
 - What can be done?
 - How are we going to do it?

Exercise on hydrodiplomacy: what are expectations from the participants towards

1. political body;
2. scientific body and;
3. the natural resource itself regarding the STAS?

Responses from participants:

Political body:

- Management of the aquifer: sustainable and equitable use;
- Prevention: conflict, over abstraction, pollution;
- Provide funding;
- Set legal framework and legislation: include farming, policy around boreholes;
- Involve stakeholders – farmers, NGOs;
- Economy;
- Raise awareness: inform population;
- Other – tangible results.

Scientific body

- Research and development:
 - o Recoding knowledge/data;
 - o Development;
 - o Promote further research;
 - o Water quality
 - o Drought prevention and adaptation
- Inform:
 - o Capacity building;
 - o assist policy makers;
 - o Produce reports;
 - o Raise awareness;
- Provide funding;
- Drought prevention and adaptation.

Natural resource

- Be protected;
- Be treated if not usable;
- Provide environmental services;
- Provide and support economic and social services;
- Ensure availability of water;
- Advocate for relevant laws;
- Meets requirements for wildlife;
- Meet supply needs;
- Show us if sustainable use or not;
- Be managed without boundaries;
- Resource cannot do all itself but we can assist getting there.

Consensus building is about mutual understanding, common objectives and sharing benefits; Challenge is to find roles in each of tasks for the various bodies;

Photography of spiders' net presented – webs are interlinked without destroying other spiders' net – spiders mutually chose to create one web.

Aim of water diplomacy is try build one web together instead of having individual webs.

Group work exercise: Assume that COP21 did not work, but now it is COP 36 in Stampriet in 2045 considering tasks from previous exercise and previously identified stakeholders:

- Which action should be done by whom and how?
- What is the role of stakeholders and how can they achieve this task?
- Choose one task (refers to expectations raised in first exercise), draw up pragmatic recommendation in 4 groups.

Group 1 - Treat aquifer if not usable by humans

- International agencies: provide funding to support research on solutions for pollution problems;
- Mining, agriculture and energies, commercial users: responsible for pollution, can provide funding, especially mines to prevention of pollution or other solution; enforce “polluter pays” principles to impacting stakeholders;
- Water supplies: treat water to ensure water is suitable for humans; ensure quality control to prevent pollution; based on water supply method be also polluters;
- Academia: advise if water is fit for human consumption and how to make it usable; help with capacity building how to make water usable and how to prevent pollution;
- Local authorities: create by-laws, and adhered to; land to be availed for pipelines;
- CSO: create awareness if realised something is wrong with the water, take ownership of resource and act collectively; protect resource;
- Farmers: economic drivers but producing food can be polluting, depending on practices; produce waste especially livestock farmers, have to have equipment and knowledge on how to maintain facilities (residue of cleaning troughs);
- Cultural authorities and TA: create awareness to their communities, but can also be polluters, e.g. by practicing rituals etc. but can also prevent pollution;
- Media: raise flags on important issues;
- Lobby groups: create awareness, provide funding, can be activists, educators;
- Ecosystem: by-products from treatment of water could be detrimental to environment; identify problems with ecosystems.

Group 2: How to ensure available of water to last forever and ensure sustainability and quantity for future generation

- Availability of water: GRN needs to regulate water use; create local water committee with authority to control licensing and monitoring of boreholes; geographic dimension: mostly agricultural activities, but not everywhere; committee should be set up, not too big rather small and agile comprising of local farmers, government departments on water, agriculture, land use etc but it is important to keep it small! Committee must have authority to inspect

and give urgent advise to GRN; GRN to commit to hear advise and either follow or give reasons why they refuse following; (In Stampriet there was a water committee in place but without authority (lion without teeth);

- Role of individual farmers: resource limited, own action to optimise water use required (collective AND individual responsibility);
- Science: inform on new technology;
- NGOs to provide assistance for developing proposals, spread the word and assist; advocate for participation;
- Science to feed in new ideas and effectiveness to deal with issues;
- Groundwater quality: GRN to regulate disposal of substances, supervision of proper construction of boreholes;
- Individual farmers responsibility: manage polluting substances and maintain boreholes, e.g. avoid leakages;

Prosopis issue: Get community to get trees cut, get individuals to have responsibility, produce charcoal, have net profit sharing principle of charcoal produced; farmers to provide all equipment; Result is to have land without prosopis trees!
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Group 3 "laws and policies"

- Technical and legal experts, scientific and academic community will have to review the existing policies, laws and regulations, assess compatibility between countries and also to extend to which laws are currently implemented;
- Depending on the outcome of the analysis, technical experts will have to come up with consultative process – depending on problems identified – and consult with relevant stakeholders (e.g. implementation of law vs. compliance: is problem in government or with farmers?); inform policy makers and in a later stage the political leaders to take gaps forwards;
- Polluter pays principle: to be consolidated what is done in all countries; using mechanism in different legislative framework- to what extend are those who pollute responsible?
- Model also for "beneficiary pays" principle for using the resource – income to be used to improve compliance, management and implementation; very much supported, as water is a precious resource it needs to be ensured that it is valued; users can determine how much is usage to inform payment or contribution; helps to ensure sustainability; economic sustainability is also needed; mitigation measures – droughts cannot be controlled – what if there is no outcome and still have to pay?
- How to meter the consumption? Easy to meter a borehole, but you cannot measure all boreholes on all farms; water is for drinking, irrigation, livestock e.g ; local authorities to assist in enforcing regulations;
- In RSA: licensing issues but assistance needed on the ground;
- Media to assist with spreading the words, operations of government for assessment and feedback to ensure transparency of review – involvement of most critical stakeholders;
- In order to advocate for harmonising, open process has to be started.

Group 4: Provide environmental services

- International and national organisations: integrate and advocate;
- Users: can be mining, irrigation farms, households but also mines: water demand management, sustainable use and policy implementation;
- Scientific community including experts; capacity building, data collection and monitoring;
- Lobby groups: media, NGO and CSO: advocate by means of protection and rehabilitation, mobilising of funds.

In future, these kind of exercise will have to be done by countries themselves!

5. Field trip

A local farmer, Mr. Louw welcomed the group and showed the group around on farms in the vicinity of Stampriet with different irrigation scheme and uses of the aquifer water, which included

- One borehole which is normally used to irrigate water melons (not cultivated now) which was in the past used with flood irrigation and open channels;
- One artesian well used with central sprinkler irrigation for lucern farming, pump-driven;
- One borehole used to irrigate vegetable farming:
 - o Drip irrigation (for tomatoes);
 - o underground irrigation (for lucerns).

Socio-economic information gathered during this field trip included:

- Harvest per ha: tomatoes 60 tons/ha, butter nut 30 tons/ha, water melons 50 tons/ha
- Input for both pumpkins and tomatoes is about 3.50 per kg (all included, also transport to market), net profit for tomatoes is currently 12.50 with average N\$ 10 depending on season and demand; sales prices in the shops are normally about double what the farmers get (N\$ 20 if they get N\$ 10);
- On average the production price for all veggies is around N\$ 120.000 per ha (tomatoes 250.000), most profitable are pumpkin considering the risk; profit higher for watermelon and tomato but risk also very much higher. Food security wise is best to produce cabbage;
- Transport costs for melons is N\$ 3,50 per melon;
- Potential income from veggies much higher than from any other product, but highly intensive in terms of labour and also inputs;
- For all products market is limited, hence it does not make sense to plant for one produce on more than 1 ha;
- Pumpkins have limited market, tomatoes are better but very risky in production. Most expensive input is fertiliser as imported from oversea (local fertiliser too poor quality, destroys soils); fertilizer for watermelon field per ha costs around N\$ 27.000 for fertilizer only!
- Lucerns are produced mostly for own consumption for smallstock mainly, with a growing period of 6 weeks, resulting in 8 harvests per year. Yield per ha is 20 tons per ha, selling at N\$ 70 for a bundle of N\$25/kg (translates into N\$2800/ton), protein content level 22%; lucerns seeds grow for 7 years, then they have to be renewed.

6. Annexes

6.1 Pictures

1. Borehole with pump for water melon irrigation (former flood irrigation):



2. Drip irrigation for green peppers:



3. Lucerns with sprinkler irrigation using artesian well



4. Farmer Mr Louw and project leader Tales Carvalho Resende, in background lucern with underground irrigation



6.2 List of participants

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