

## FINAL REPORT

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<b>Mission itinerary:</b>  Perth (Australia) – Dubai – Amman (Jordan) Return.		<b>Mission dates:</b>  7 <sup>th</sup> May – 1 <sup>st</sup> June 2014
<p><b>Introduction/Background:</b></p> <p>Within the Integrated Watershed Management (IWSM) component of the BRP CAP, a major section is devoted to improvement of the Badia ecosystem productivity through the Plantation and Reseeding Project. The Biophysical component of the integrated watershed management plan aims at applying the most appropriate macro and micro water harvesting techniques integrated with improvement of ecosystem productivity through plantation of indigenous fodder shrubs in micro-catchments. These shrubs are to be produced in Nurseries.</p> <p>I was contracted by USAID through UNOPS to provide an organisational support role to the BRP for this project.</p> <p>The task required an enormous undertaking of producing around 11.7 million shrubs to be planted on 22,000 hectares within the 12 watersheds identified in the project. Community involvement was to be paramount to the project and so the original proposal was to build nurseries from scratch in each of the 12 watershed areas. The timetable outlined for this to be achieved was by the 2018/19 season. This meant that 1.75 – 2 million shrubs would need to be produced to plant on 3500 hectares for each of the 6 seasons starting from February 2014.</p> <p>Unfortunately, major delays in this process have occurred as a result of the inability of the various ministries and the BRP to agree on a suitable structure and mechanism by which decisions could be made to implement the aims of the project.</p>		

**Mission Objectives / Deliverables:**

My principal area of responsibility has been with the Nurseries and Plantations part of the BRP-CAP. I have conducted my activities in close collaboration with members of the “*Badia Consulting Group*”, and the BRP-CAP and MoA counterparts.

After assessing the situation of the project in June 2013 my prime objective became to determine how the very challenging objectives of the BRP-CAP could be achieved with respect to the Nurseries and Plantations part of the Project. That was, how to take the current capability of the group from 2-300,000 seedlings per year to almost 2 million seedlings per year (to both grow in Nurseries and successfully transplant to the Badia). To this end I have conducted considerable investigation into Nursery and Plantation operations in both Australia and Jordan and have come up with what I believe is the solution to the dilemma of how to achieve the stated goals within the time scale and budget of the project. A presentation was prepared to deliver to the implementing partners and this was first delivered to BRP and USAID staff on the 18<sup>th</sup> June 2013. Over the following 11 months I have further researched and refined this presentation and delivered it twice more. The second occasion was to a technical group of MoA and Forestry staff on 4<sup>th</sup> February 2014 and finally to the General Secretary for Agriculture and the BRP Steering Committee on the 26<sup>th</sup> March 2014. The Steering Committee was happy with my plan and asked me to write a proposal document. This was done immediately and submitted to the BRP on 29<sup>th</sup> March 2014. On the 19<sup>th</sup> of May the General Secretary for Agriculture, the BRP Steering Committee and I met again to discuss the proposal. Again the ideas and proposal in general were endorsed by the group subject to a separate further assessment of a smaller committee, which was appointed at this meeting. Unfortunately, the delay caused by this last edict, will mean that final approval will not be forthcoming until after my contract has expired on May 30. The possibility of a “no cost extension” was raised, as funds will remain in the budget after the expiry of the project. This would require a memo from BRP to USAID requesting this extension. For reasons unknown, this request has not been forthcoming and so we must assume that BRP is happy to continue without our input or further support.

Deliverables representing my duties within the project were revised and submitted to the AoR on 24<sup>th</sup> of January 2014. Most of my deliverables have registered some level of achievement but as they refer mainly to nursery practices, they are on-going and so they remain mostly unchanged. Unfortunately the Nursery deliverables were meant to have been applied to the new nurseries we were constructing within the communities at the 12 watershed sites on the Badia. In the absence of even one community being identified or a single nursery site chosen, I have focused my deliverables on the 4 existing MoA nurseries that have been growing the seedlings by the traditional method.

As the project and my involvement and understanding of it has evolved, my primary aim has become to convince the BRP and the MoA that the only solution to achieving the stated goals is to construct and commission a primary “Cell tray Nursery” based on the Australian system. To this end an extra Deliverable was added to my list as part of the revision of January 2014.

**Mission Actual Results / Challenges:**

- **Deliverable** Visit existing nurseries at selected sites and do a comprehensive review with respect to the setup of the operation (existing facilities and what modifications and additions may be needed to enable the successful production of the quality and quantity of seedlings required), in view of providing the following:
  - **Action:** The 4 participating nurseries were visited during the March mission and their ongoing reviews were continued. The cell tray experiment was assessed at each nursery as well as the efforts which each had made towards the production of the 350,000 seedlings being grown for imminent transport to the Badia to go into plantations. Observations and actions were reported in Attachment 1 and 2. (Submitted to UNOPS March 2014). The 3 Jordan Valley Nurseries were visited during the current mission to give instruction as to the preparation for transport of the seedlings to the field. The detail of this is attached (Appendix 2)
  
- **Deliverable** For each BRP-CAP selected Nursery site, produce a detailed report suggesting possible remedies for existing problems (if any) and a list (for discussion) of all recommended improvements with respect to all of the following points:
  - **Deliverable** Potting mixture used, with a view to improving the existing or substituting / standardising for a better mixture.
  - **Action:** Improved potting mixture recommended had been previously recommended but only a token effort had been made by nurseries to make the change. At Deyr Alla, bales of peatmoss had been purchased but this had not been used in the mixture. At Ghor-al Safi, the best effort at upgrading the mix had been made with the use of a 3 soil, 1 sand and 1 manure mixture. (Attachment 1 and 2 previously submitted to UNOPS). The relative costs of potting mix between the clay-loam mix generally being used and the suggested new mix of perlite and peat was calculated and these figures appear in the Nursery Proposal Document. (Appendix 1)
  - **Deliverable** Container used (size, material, etc.). May want to consider standardising containers over all nurseries to suit mechanisation both for seedling production and for field transplantation.
  - **Action:** A revised container type and size suggested as an interim system by way of the recommendation resulting from the June 2013 mission but this has not yet been implemented at any of the nurseries. The move to the ultimate solution of using cell trays moved a step closer with the achievement of some level of success at each of the 4 nurseries in growing the cell trays as part of the experiment set up in February. Staff were enthusiastic and seemed keen to embrace the new system. Full details submitted to UNOPS (March 2014) in Attachment 2 & 3. After March, the cell trays were neglected at Deyr Alla and Ghor-Al-Safi Nurseries and allowed to die. At Al-Basah, however, some “plugs” survived. These were transported to the field and were sown as a separate experiment at Safawi (See Appendix 2)
  - **Deliverable** Species produced (this will be discussed at a later stage after field visit) (in collaboration with Range ecologist and management).
  - **Action:** The only species being produced in bulk for the plantations was *Atriplex halimus*. As part of the cell tray experiment, however, *Artemisia herba alba* was grown from seed collected in January. If I have any continued input to the project past May 2014, I will be trying to include *Artemisia* and *Salsola vermiculata* included in future plantings.
  - **Deliverable** Seed sources and treatments (in collaboration with Range ecologist and

management).

- **Action:** Seed source recommendations had been made in various reports and e-mails. (Including Appendix 2). Seed for planting the current batch of seedlings had been sourced from Shorbak and Khaldiyyah. Seed collection for future nursery sowings I have recommended should be from the Shamaury Wildlife Park. Seed of *Artemisia herba alba* was collected from Osaghi in January.
- **Deliverable** Timing of seed germination and ideal duration of growth in nursery before transplanting to the field.
- **Action:** Different options for timing of seed germination has been discussed with MoE and MoA personnel. Ideal duration of growth period has also been established and agreed upon (See Annex A, B & C submitted previously) Delays caused at the Ministerial level in deciding on a plan for the season and the allocating of resources has meant that seedlings were not sown in nurseries until January. This has resulted in the need to correspondingly delay the transplanting to the field. This was scheduled to start on March 20 and so my previous mission was timetabled to arrive in Amman on March 19. Unfortunately, no final permission to proceed had been granted by the end of this mission on March 29. The risks of a very late planting together with use of seedlings which are still immature and not properly hardened were discussed with counterparts and addressed in Attachments 2 and 3 (submitted March). Despite these recommendations, it was planned to proceed with the planting and I received a request to arrive again in time for the newest schedule of planting in the Badia on 8<sup>th</sup> of May (e-mail correspondence Dr Muwafaq). Arriving on that day I was informed that final permissions were still pending. These were eventually received on the 18<sup>th</sup> of May and plantation operations began on the 19<sup>th</sup> May. The future timing of seed planting in the nursery and corresponding transplantation to the Badia will depend on where it is decided that the primary nursery is located. If it is in the Jordan Valley, which I believe is the best option, seed should be planted in July and seedlings transplanted to the field in January. If it is to be located in the Badia, seed should be planted in April and transplants to the field in September.
- **Deliverable** Watering of Seedlings (water quality, type of irrigation used and schedule)
- **Action:** Specific details of water quality required and schedule of irrigation was determined in Annex B submitted June 2013.
- **Deliverable** Use of fertilisers and chemicals for pest and disease control.
- **Action:** Fertilizer treatment for potting media and for regular application to seedlings was determined and reported in Annex B submitted previously. No action has been taken on this at any of the nurseries. Eng. Mervat tried to procure fertiliser for applications to shrubs in February but was unable to secure the permission to do so. A trial of applying liquid fertiliser (bought by me from Australia) to a row of 2000 plants at Al-Basah nursery resulted in growth increase of 200 to 300%. A reminder of the importance of this has been included in Appendix 2.
- **Deliverable** Staff availability to conduct work (may need extra casual labour at peak times).
- **Action:** Pending. This will become a priority if construction of a cell tray nursery is approved. A large force of community labour was procured for the plantation exercise at Safawi in late May 2014. This has created some problems with achieving a reasonable level of quality control. See report (Appendix 2)
- **Deliverable** Seedlings hardening and preparation for delivery on site
- **Action:** Seedling hardening schedule was determined and included in Annex B submitted in

June. No effort to adhere to this schedule has been made at any of the MoA nurseries and in March, many seedlings were still under plastic house protection upon my inspections. Suggestion to staff to remove plastic immediately was made and follow up recommendations as to how to proceed given the less than perfect situation was covered in Attachment 2 & 3. Another reminder of the importance of seedling hardening has been included in Appendix 2.

- **Deliverable** Delivery operation to site
  - **Action:** The use of plastic crates suggested previously (see Annex B) has been implemented. Training of staff to prune seedlings so that they become more suitable for transport (crates can be stacked) and for transplantation (less leaf area means better survival chances). See Attachment 3 and Appendix 2. MoA trucks were used to transport seedlings in crates to Azraq and Safawi in May 2014. This was a big improvement on the system used in January to transport seedlings to Ausagi to replace plants which had died. During this time, bags were thrown several layers deep into the back of trucks with the resultant significant damage to foliage. The MoA trucks used in May however, are not ideal for the purpose. They have fixed sides and so all crates had to be loaded and unloaded manually and over the top of the very high sides. Suggestion has been made in Appendix 2, that a flatbed truck with canvas sides be used in future transport operations.
  - **Deliverable** Review plantation operations
  - **Action :** Existing plantations at Ausagi W, Ausagi E and Arenbah were visited on previous missions and specific recommendations were made with respect to improving these operations (see Annex A and C). New plantations at Al-Azraq and Safawi were established during the current mission (May 2014). A comprehensive review of these plantations is included in Appendix 2.
- **Deliverable** Establish the yearly calendar for timely production and delivery,
  - **Action:** For the existing MoA nurseries which are growing the seedlings as an interim measure until the nurseries which have been specified in the BRP-CAP document are constructed, a calendar or timetable has been recommended in Appendix 2. Once a decision has been taken to build the primary nursery I have conceived, the seasonal timetable will depend on the location of the nursery. If the nursery is in the Jordan Valley, the warm mild winter can be taken advantage of and seed can be sown in July and transplanted on the Badia in January. If the nursery is on the Badia, then seed will need to be sown in April and transplanted to the field in September.
  - **Deliverable** Help establishing a record-keeping book / system of each nursery activities (calendar of operations, staff involved, material accounted for, equipment used, costs? etc.,)
  - **Action:** This was discussed previously with MoE and MoA personnel but it was not practical to implement until a specific nursery was executing the full program of shrub production for BRP.
  - **Deliverable** Participating to plantations implementations-operations and make proposals for improvement,
  - **Action: Four** full days were spent participating in and helping to supervise the plantation operations being conducted at Al-Azraq and Safawi between May 19 to May 23 2014. My report into these activities (Appendix 2) was fairly critical, as many of the recommendations I have made had not been observed. The report covers all aspects that need to be addressed before another plantation exercise is contemplated.
  - **Deliverable** Train nursery counterparts “on-site” in all aspects of nursery operations

- **Action:** Training was conducted at Deyr Alla and Ghor al Safi Nurseries in June. (Attachment 2 and 3). Some further training was undertaken with staff at Al-Basah, Deyr Alla and Ghor al Safi in May 2014 with regard to pruning and packaging for transport (Appendix 2). If a primary nursery is constructed as per my proposal, an extensive training program will need to be designed and implemented to teach community and MoA personnel the methods of running a modern, high production quality system.
- **Deliverable** To make a presentation to Implementing partners, a comprehensive study on a Nursery system which has the potential to achieve the outcomes of the BRP-CAP if implemented.
- **Action:** On Wednesday 26<sup>th</sup> March this was finally achieved. The seminar was delivered to the General Secretary for Agriculture and the Steering Committee of the BRP. In attendance were: Mr Radi Al Tarawneh, Mr Abdl Haleem Dojan, Mr Nabeel Oudeh, Dr Muwafaq Al Serhan, Mr Wael Rashdan, Mr Khalid Nawaieseh, Ms Eman Bani Hasan, Mr Essa Shoubaki, Dr Marwan Sulfan, Dr Kamal Khairallah, Mr Mohamad Al Aref, Mrs Mervat Qararah, Mr Maher Shaniale, and Mr Euan Thompson. It was very well received by the delegates and I was instructed to prepare for them a proposal to build a cell tray nursery as I had proposed in the presentation. This proposal was prepared and sent to Dr Marwan (on March 29 2014) to forward to the General Secretary. (See Attachment 4). A copy of the seminar is contained in Attachment 1. Unfortunately, this proposal was not forwarded to the committee as Dr Marwan wanted to get firm pricing on the list of materials and equipment which I had attached to the proposal. Engineer Mervat worked hard in getting as many prices as possible from items which could be sourced in Jordan. Meanwhile I supplied prices for goods which would need to come from Australia. On the 19<sup>th</sup> May 2014 we conducted another meeting with the Secretary General and the BRP Steering Committee to discuss the proposal. Again the proposal was endorsed by the group but subject to a separate assessment of a sub-committee which was appointed at the time.

## Challenges

The Nurseries and Plantations part of Project has fallen significantly short of its milestones as set out in the BRP-CAP document. At this point 7 nurseries should have been constructed and in operation within the communities of the identified watersheds with another 5 to be ready for 2014-15. In addition at least 2 million seedlings should have been established in plantations. To date, no new nurseries have been established and the number of shrubs surviving in plantations may be approaching 600,000.

There are three prime reasons for this substantial shortfall. Firstly, there has been a failure to establish a workable system within the BRP and the implementing partners to date. No delegation of authority to commit funds to get the process operating at the required level has occurred. Secondly, no communities within the 12 watershed areas specified have been identified who can take ownership of the nursery and plantation operations in their particular areas. Thirdly, the logistics and the cost involved in continuing to operate using big 2 litre bags (instead of the 80cc cells recommended) has restricted the quantities which are manageable to around 300,000 per season instead of the required 2 million.

The budget for this part of the BRP-CAP project is US\$5.3 million and the requirement is to plant 11.75 million shrubs on 22,000 hectares. This equates to just 45c per shrub. It is an impossibility to grow, transport and establish shrubs within this budget using the existing methods. Substantial savings can be achieved once a cell tray nursery is established and if mechanisation is used for planting in the field (>JOD300, 000 saving for 1 million shrubs –see Appendix 2). Even with these savings, growing the seedling, transporting planting and managing will very likely exceed this budget

**Recommendations and Follow-Up Actions:**

Technical recommendations are covered in Reports submitted during the missions of the past 11 months).

Constructing a Cell tray Nursery using the modern system I have identified in my proposal is the only way the BRP can hope to achieve close to the targets set out in the BRP-CAP document. I believe that the implementing partners have only now just begun to accept this. As my contract with UNOPS and USAID expired on May 30 2014, the BRP will need to come up with a new mechanism if they require assistance to establish this type of facility in Jordan from myself and my 2 nursery colleagues in Australia.

**Required Attachments:**

- Schedule and list of meetings conducted/ places visited
- List Partners/ Stakeholders met

**Attachment 1:** Schedule and list of meetings conducted/ places visited.

<b>Day</b>	<b>Date</b>	<b>Activity</b>
1	7 <sup>th</sup> May	Perth (dept 22.05) to Perth toDubai (arr 5.00)
2	8 <sup>th</sup> May	Dubai – Amman (arr 10.35). Amman – call colleagues.
3	9 <sup>th</sup> May	e-mails and discussions with colleagues.
4	10 <sup>th</sup> May	Refining Nursery Proposal Document.
5	11 <sup>th</sup> May	Meeting at MoA with Dr Muwafaq, Saddam Shorfats and Mohammed Al-Adwan.
6	12 <sup>th</sup> May	Meeting Dr Marwan, Dr Kamal and Eng Mervat at MoA. Preparation of supply list with Eng. Mervat.
7	13 <sup>th</sup> May	Further preparation on list of equipment and supplies for Nursery Proposal.
8	14 <sup>th</sup> May	Meeting at MoA with Dr Muwafaq.
9	15 <sup>th</sup> May	Trip to Al-Basah and Deyr Alla
10	16 <sup>th</sup> May	Completion of Nursery Proposal.
11	17 <sup>th</sup> May	Trip to Ghor-Al-Safi
12	18 <sup>th</sup> May	UNOPS.
13	19 <sup>th</sup> May	Meeting at MoA with General Secretary of Agriculture and BRP Steering Committee. Trip to Safawi region.
14	20 <sup>th</sup> May	Al-Azraq – plantation operations.
15	21 <sup>st</sup> May	. Al-Azraq – plantation operations
16	22 <sup>nd</sup> May	Safawi-plantation operations.
17	23 <sup>rd</sup> May	Safawi plantation operations – Mafraq – Amman.
18	24 <sup>th</sup> May	Begin report on Nurseries and Plantations document.
19	25 <sup>th</sup> May	Report on Nurseries and Plantations.

20	26 <sup>th</sup> May	Preparation of Photos for Final Report.
21	27 <sup>th</sup> May	.
22	28 <sup>th</sup> May	
23	29 <sup>th</sup> May	
24	30 <sup>th</sup> May	
25	31 <sup>st</sup> May	
26	1 <sup>st</sup> June	
27	2 <sup>nd</sup> June	

**Attachment 2:** List Partners/ Stakeholders met.

<b>Name</b>	<b>Designation</b>
Qararah Mervat	Engineer MoA
Alrashdan Wael	Director of Rangeland. MoA
Banihassan Eman	Range Specialist. MoA
Diah, Beatrice	Sn Acquisition and Assistance Specialist, USAID
Odwan Monthir	Forrest and Rangeland Specialist. MoA
Hajahjah Khamees	Director of Forrestry.
Aln Momed	Technician. Deir Alla
Mansor Ahmed	Technician. Deir Alla/ Al Basah
Kamal, Khairallah	Consultant to BRM PMU
Hishoosh Nedal	Nursery Manager. Ghor –Al-Safi
Jamal Hasan	Nursery Manager. Khaldiyyah.
Khoffash, Tuleen	Project Management Specialist, USAID
Marwan, Suifan	BRP-PMU Director
Barrakat Baker	Director of Agriculture in North Ghor.
El- Nairn Mahmood	Nursery Manager. Deir Alla
Muwafaq, Al-Serhan	BRP Project Manager at MoA
Odeh, Al Meshan	Director, Badia Research and Development Programme