An Inventory of Agricultural Water Technologies and Practices in NAMIBIA

I. GENERAL	Technology 1= name	Technology 2 =name	Technology 3 = name	Technology 4 = name
1. Name of water technology or practice	**nombete (planting beds)**	**omarumba (valley bottom cultivation)**	**shallow wells & hand pumps**	**boreholes, water points**
1.0 Detailed description of technology or practice (give technical description, refer to Annexes 1 & 2; attach an illustation/picture if technology is not in the lists)	See picture. Small vegetable gardens along river edge. Variety of raised, ridged beds approx 400x400mm, dug out and filled with manure/organic matter. Tomatoes, pumpkins and other vegetables. Seedling beds protected with thatch grass against direct sun, and with thorn branches against animals. Potential for adaptation (tied ridges) to harvest rainfall run-off.	See picture. Fields in low-lying natural drainage channels. Water holding capacity of the soil better than in surrounding sandy areas.	See pictures. Hand dug wells (indigenous), improved with concrete lining, hand pumps and concrete animal watering troughs (imported)	See pictures. Boreholes (tubewells) equipped for separate human and animal consumption, with rare use for communal vegetable gardens.
1.1 Source of technology (Indigenous or Imported)	indigenous	indigenous	indigenous & imported	imported
1.2 If imported, any modifications done (Yes or No)	na	na		y
1.3 Provider of technology[b]	na	na		Govt, Rural Water Supply
1.4 Who developed/designed the technology package[c]	food gardeners themselves	farmers		RWS
1.5 Who installed the technology package[c]	food gardeners themselves	farmers		RWS with community labour
1.6 Source of water (surface, groundwater, harvested rainwater, wastewater, etc.)	river	water in the soil profile		groundwater (120-20m+)
1.7 Is the technology used for more than one use (multiple uses)? (Yes/No)	no	no		y
1.8 If yes, what are they?	na	na		human needs, animal watering, sometimes communal vegetable gardens to generate income to buy diesel for water point
1.9 If yes, how is the technical design adapted compared to the design for single use?	na	na		single borehole and pump; separate storage tanks and extraction points (tap, trough) for domestic & animal watering; where relevant specific adaptation for use by elephants/game; motor in protective cage which doubles as stand for human needs water tank.
1.10 What is seen as advantages of multiple use systems as compared to the design for one single use?	na	na		Inevitable, due to scarcity of water and cost of development of boreholes
1.11 What are the disadvantages of multiple use systems?	na	na		Possible disadvantages are already overcome through system layout: potential damage by animals avoided by placing motor in steel cage, and by some communities by building a pole fence around their tapstand; contamination by animals avoided by placing drinking trough a safe distance from the borehole, tanks and tapstand.
2. Specific location/address & distance from main urban center (km)	5km from Rundu town (Sauyema); other?	omarumbas all over the country		Countrywide in rural areas

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3. Main source(s) of income in site	vegetable sales	farming		Subsistence farming; remittances from family members working in town
4. Other source(s) of income in site	unknown	unknown		Assistance by fellow villagers to ultrapoor, occasional food aid.
5. Type of user (community or individual households)	individual households	individual households		community
6. No. of benefitted households; average size of households	40-50?; 6-7?	??, 6-7?		vra Miriam
7. Total size for all beneficiaries (ha) -note average size per beneficiary	5ha near Rundu? Other?; 0.1 - 0.2 ha	highly varied		Miriam?
8. Profile of beneficiaries (if mostly ultra poor, poor, non-poor or mixed)[a]	ultra-poor; poor	mixed		poor
8.1 Was project/program area selected based on available data on comparative incidence of poverty? (Yes/No)	no	no		yes
8.2 If yes, indicate the poverty status of the project area relative to all other regions of the country	na	na		primarily in communal areas; not in commercial farms (????) and towns
8.3 Were particular populations or groups targeted within the project area (e.g., based on baseline socioeconomic surveys or participatory poverty assessment, etc)? (Yes/No)	na	na		no, entire communal area targeted
8.4 If yes, indicate the poverty status of the beneficiaries relative to the non-beneficiaries in the project/programme area	na	na		>35% spend >60% of household income on food.
8.5 Indicate the proportion of women beneficiaries	majority	??		>50%
9. Month & year technology was introduced	2000	traditional		Programme since 1993
10. No. of years of adoption	5	traditional		up to 12 years
11. Is technology still in use (Yes or No)	y	y		y
12. If not anymore, why? (STOP here for this technology)	na	na		na
13. Type of technology (water capture such as small dams, rainwater harvesting OR distribution/water use such as treadle pumps, drips, etc.)	distribution/water use; water and nutrient conservation	water capture & conservation; in-situ use; sometimes supported with irrigation from shallow well; potential for treadle pumps		boreholes equipped with diesel engine, windmill, handpump or solar installation, depending on choice of community

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14. Describe the counterfactual or the old technology (practice) the new water management technology/practice replaces.	They used to cut only a small hole with a hoe for planting, but the applied water spilled out and regular rewatering was necessary. They experimented with enlarging the dug-out area and thus, over time, the current practice evolved.	na		Nothing, or borehole with handpump
14.1 Is the change partial or complete?	complete	na		varies
14.2 If the change is partial, describe the elements of the old system that were preserved and those that were discarded	still using hoe to prepare planting beds, but no-one uses the small holes anymore.	na		borehole retained, where appropriate
II. Profitability of the TECHNOLOGY				
a. The new technology or management practice (Note: prepare an enterprise or partial budget)				
15. What is the estimated and actual life of the technology? (in years)	indefinite. Reshaped seasonally	indefinite. Reshaped seasonally		
16. Was technology given out for free?	na	na		Yes, but community provided labour and commits to do O&M at own cost. Major repairs done by RWS until 'final handover'
17. If NOT totally free, what is the capital cost of technology (reference YEAR of cost estimate; separate costs for equipment/tool/parts, pipes for conveyance into farm, installation, water source development)	none. However, small manual pumps would be very labour saving for them, which could enable them to expand.	na		Installation: N$160 000 (diesel driven)
18. Cost of operation & maintenance per ha (indicate what items are included-- cost of pumping in terms of fuel, energy/electricity, labor costs; maintenance and repair costs, etc.)	own labour only; eventual replacement of hoe.	normal ploughing costs		Operation & Maintenance N$3500/a (diesel driven), N$1500/a (windmill), N$1000/a (handpump)
18.1. Does the new technology reqiure more or less labour than the old technology?	more for digging; less often for irrigating	na		generally less labour, more cash
19. Crops produced (indicate main crops vs. secondary crops)	vegetables, esp tomato, pumpkin	mahangu, maize		Productive use of water mostly for livestock. Some communities grow vegetables for sale to help pay for diesel for the water point (not very common). Gardening communal, not individual (2)

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20. Changes in crops grown (into what & when) & reason for new crops or switching	na	na		na
21. Indicate how many croppings per year (1, 2, or 3)	ni	1		0-2
22. Increase in production (in kg/ha) due to technology (including amount used for own consumption & amount sold to market)	ni	na		
22. Increase in revenues (in local currency) due to technology (less amount used for own consumption)	ni	na		ni
23. Estimated & actual financial profits (gross revenues-costs of all cash inputs)	ni	na		ni
b. Old water management technology or practice (prepare an enterprise budget) LEAVE OUT QUESTION 24-29 IF NO OLD TECHNOLOGY WAS REPLACED				
24. What is the estimated and actual life of the technology? (in years)		na		see above
25. What is the capital cost of technology?		na		see above
26. Cost of operation & maintenance per ha (indicate what items are included-- cost of pumping in terms of fuel, energy/electricity, labor costs; maintenance and repair costs, etc.A61)		na		see above
27. Crops produced (indicate main crops vs. secondary crops)		na		0
28. Indicate how many croppings per year (1, 2, or 3)		na		0
29. Estimated & actual financial profits (gross revenues-costs of all cash inputs)		na		0
III. ROLE OF INSTITUTIONS/ORGANIZATIONS				
30. Support by NGOs (specify the NGO & indicate if international or local)	na	na	Lihepurura NGO	na
30.1 Indicate the total value of the support (in Dollars or local currency)	na	na	unknown	na
30.2 Is the support still on-going or withdrawn? (1. Ongoing; 2. Withdrawn)	na	na	withdrawn	na

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30.3 If the institutional support is withdrawn, is the system still functioning?	na	na	y	na
30.4 If the system is still functioning, is the pace of technology/practice uptake continuing at the same or better pace than when there was NGO institutional support? (1. Same pace; 2. Better pace; 3. Slowed down)	na	na	slowed down	na
30.5 Give reasons for the response to 30.4	na	na	No new installations; some installations in need of repair	na
31. Specific support provided[d]	na	na	installation of improved wells, drinking troughs and Bush Pumps	na
32. Support by government extension workers & other government agency (specify which agency & whether local or national government) (yes or no)	na	unknown	unknown	yes
32.1 Indicate the total value of the support (in Dollars or local currency)	na	na	na	Capital: N$392m (1993-2004); Recurrent: N$703m (1990-2004); Donors:N$269m (1990-2004)
32.2 Is the support still on-going or withdrawn? (1. Ongoing; 2. Withdrawn)	na	na	na	Development: ongoing; O&M: ongoing support, 42% own contribution by communities
32.3 If the institutional support is withdrawn, is the system still functioning?	na	na	na	Yes, although diesel not always affordable, then communities pump less, and where possible use alternatives for livestock watering.
32.4 If the system is still functioning, is the pace of technology/practice uptake continuing at the same or better pace than when there was Government institutional support? (1. Same pace; 2. Better pace; 3. Slowed down)	na	na	na	na
32.5 Give reasons for the response to 32.4	na	na	na	ongoing
33. Specific support provided[d]	na	na	na	installation, institutional development and training of water committees, monitoring and follow-up support
34. Support by private enterprises (specify enterprise)	na	na	na	na
35. Specific support provided[d]	na	na	na	na
36. Support by other organization (specify organization - e.g. community organization) or private sector service provider (e.g. manufacturers/dealers/retailers)	na	na	na	na

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36.1 Indicate the total value of the support (in Dollars or local currency)	na	na	na	na
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36.3 If the institutional support is withdrawn, is the system still functioning?	na	na	na	na
36.4 If the system is still functioning, is the pace of technology/practice uptake continuing at the same or better pace than when there was institutional support? (1. Same pace; 2. Better pace; 3. Slowed down)	na	na	na	na
36.5 Give reasons for the response to 36.4	na	na	na	na
37. Specific support provided[d]	na	na	na	na
IV. FACTORS CONTRIBUTING TO PROFITABILITY & SUSTAINABILITY OF TECHNOLOGY (see Annex 3 for sample answers #40-45)				
38. Ease in implementation (Yes & No)	y	y	n	n
39. Ease in O&M (Yes & No)	y	y	y	y
40. Suitability of technology/How adapted to local conditions (well, not so well, etc.)	Very well adapted. No cost, own labour only. Independently manageable by household.	well	relatively well	well
41. Cultural acceptability	y	y	y	yes, except O&M costs
42. Effectiveness	y	y	y	y
42. Environmental impact	low. No evidence of salinisation, erosion.	low	low	low
43. Other advantages (factors contributing to profitability & Suitability)	own control			
44. Other disadvantages (factors constraining profitability & sustainability-- e.g. lack of specific support services or supplies of specific inputs, etc.-- be very specific)	Vulnerable to flooding. Could benefit from manual pumping to reduce labour requirement and enable expansion. Vulnerable to crop theft; far from dwellings; yet people continue doing it!		could possibly benefit from improved ownership definition and local maintenance training and responsibility	affordability of O&M of diesel installations in cash-poor livelihoods systems; remoteness and isolation from potential markets for produce

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[a] 1: ultra poor - extremely poor or most vulnerable engaged in rainfed cereal production, no potential to diversify because of lack of land, no livestock, limited available labor, no off-farm

[b] 1: indigenous knowledge; 2: NGO (specify); 3: government agency/extension worker; 4: private enterprises; 5: other (specify)

[c] 1:government agency (extension agency/irrigation advisory services/University); 2: representative/authorized dealers of manufacturers; 3: private consultant; 4: farmers themselves; 5: other

[d] 1:introduction of technology; 2: facilitated access to inputs; 3: facilitated access to output markets; 4: provision of (or facilitated access to) credit; 5: capacity building such as training (specify

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