



Impact Assessment of Adaptation Options and Strategies
for Coping with Climate Change on the Livelihoods of
Pastoral and Agro-pastoral Communities in Sudan'
Butana Area

By

Abdelhamed M. M. Ibrahim

Supervisor

Prof. Abbas E. M. Elamin

November 2013

Executed activities in the last months:

- ① Structured questionnaire has been designed and reviewed.
- ① Rapid Rural Appraisal (RRA) and base line survey using structured questionnaire was conducted to collect the basic relevant information related to the impacts of climate change and adaptation options.
- ① About 20 villages have been selected from pastorals and agro-pastorals communities and the sample has been randomly selected from participant and non participant communities and directly interviewed.
- ① Secondary data (which include climate data) acquired through literature review and the collection of available statistics from the Government departments and non-government organizations.

Baseline survey

- ◆ The survey areas included in three states Gadarif, Gezira and Khartoum
- ◆ The survey and data collection has been completed in two states and the data of the third state is under processed
- ◆ All data collected has been entered in SPSS statistical package program

Secondary data needed

- ➔ Secondary data include:
- ➔ Metrological data (temperature and rainfall)
- ➔ Modeled data from DSSAT or Global Range Model
- ➔ Prices data
- ➔ Any other data needed

Table 1. Distribution of Sample size

state	Villages of BIDRP project interventions	Number of villages		Number of respondent
		Participants	Nonparticipant s	
Gadarif	34	8	2	100
Gezira	31	3	2	70
Khartoum	26	3	2	50
Kassala	22	0		
River Nile	27	0		
Holders from other regions*				31
Total	140	14	6	251

*Livestock holders come to Butana from other regions in rainy season

What will be happened by the end of December 2013

- Completed data collection
- Modeled data using DSSAT or model to run the TOA-MD model it is very important before the end of December 2013.
- Metrological data (temperature and rainfall for the last 40 year to run Ricardian Model
- Draft paper using TOA-MD model must be completed by the end of December 2013.

Preliminary results

Characteristics of sampled respondents

Table 2. Distribution of animal keepers in Butana area according to their sex

State		Male	female
Gedarif	Count	82	18
	% within state	82.0%	18.0%
Gezira	Count	35	18
	% within state	66.0%	34.0%
Total (the two states)	Count	117	36
	% within state	76.5%	23.5%

Table 3. distribution of animal keepers in Butana area according to their main activity

State		livestock production	crop production	livestock and crop production	Total
Gedarif	count	11	12	77	100
	% Within the state	11.0%	12.0%	77.0%	100.0%
Gezira	Count	44	6	3	53
	% Within the state	83.0%	11.3%	5.7%	100.0%
Total (the two states)	Count	55	18	80	153
	% within the state	35.9%	11.8%	52.3%	100.0%

Table 4. Animal herds component in Butana area in the begging of the year before and after BIRDIP interventions

		2008				2012			
		Sheep	goat	cattle	camel	Sheep	goat	cattle	camel
Male	Mean	13.3	4.8	2.3	3.08	13.9	3.2	2.4	2.7
	STDEV	10.8	1.2	1.3	2.6	7.0	2.2	1.01	1.8
Female	Mean	75.4	22.5	10.02	20.09	78.1	23.3	6.9	13.1
	STDEV	59.7	7.9	6.4	13.6	66.2	15.0	3.9	12.6
Male and female	Mean	85.3	25.5	10.8	21.8	88.6	25.8	7.5	14.7
	STDEV	67.3	9.1	7.4	14.4	71.2	16.3	4.5	14.3

Table 5. Distribution of animal keepers according to sharing in the key techniques for rangeland development and improvement.

State	Resting and deferred grazing		Reseeding		Water management	
	Yes	No	yes	No	yes	No
Gedarif	65%	35%	67.0%	33.0%	25%	75%
Gezira	9.4%	90.6%	58.2%	41.8%	23%	79.7%
Total (two states)	45.8%	54.2%	64.1%	35.9%	24.3%	75.7

Findings:

- Females represent a considerable rate of animal keepers in Butana area (18 % and 34 % in Gedarif and Gezira state, respectively, and about 24% in the two states).
- The majority of animal keepers in Gedarif state are agro-pastoralists (77%), while the most of them in Gezira state are pure pastoralists (83%).
- It is noticed that there is increased in numbers of sheep and goats after Butana Integrated Rural Development Project (BIRDP) interventions.
- The results of conducted survey showed that the most of animal keepers in Butana area share in the key techniques for rangeland development and improvement. Table 4.
- All the data used in this report are results from author's conducted survey in Butana area May and June 2013

- **Benefit cost ratio:**
- In cost-benefit analysis, we compare the costs and benefits of one or more projects to determine which are worthwhile, and which should be prioritized when there are multiple projects. The computations are similar to those in cost effectiveness analysis; we simply are applying economic evaluation techniques to two entities: costs and benefits.
- The minimum requirement for a project or investment to be judged worthwhile is that its benefit-cost ratio be at least 1.0. This means that the benefits equal or exceed the costs of the project.
- Here the benefit/cost ratio would be calculated for some herd size under the situation of Butana Integrated Rural Development Project (BIRDP) interventions

Table 6. Total costs and revenues for the four types of animal in Butana area (SDG thousands)

Year	Total costs				Total revenues			
	Sheep	goat	cattle	camel	Sheep	goat	cattle	camel
1 (2012)	9.01	9.88	78.15	75.1	4.17	3.89	34.25	35.65
2 (2013)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
3 (2014)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
4 (2015)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
5 (2016)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
6 (2017)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
7(2018)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
8(2019)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
9(2020)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65
10(2021)	1.51	1.88	8.15	5.1	4.17	3.89	34.25	35.65

Table 7. The present value of costs and revenues for four types of animal in Butana area (SDG thousands)

year	Present value of total cost				Present value of total revenue				Discount factor
	Sheep	goat	cattle	camel	Sheep	goat	cattle	camel	
1(2012)	7.64	8.37	66.23	63.64	3.53	3.30	29.03	30.21	0.847
2 (2013)	1.08	1.35	5.85	3.66	2.99	2.79	24.60	25.60	0.718
3 (2014)	0.92	1.14	4.96	3.10	2.54	2.37	20.85	21.70	0.60
4 (2015)	0.78	0.97	4.20	2.63	2.15	2.01	17.67	18.39	0.516
5 (2016)	0.66	0.82	3.56	2.23	1.82	1.70	14.97	15.58	0.4371
6 (2017)	0.56	0.70	3.02	1.89	1.54	1.44	12.69	13.21	0.370
7(2018)	0.47	0.59	2.56	1.60	1.31	1.22	10.75	11.19	0.314
8(2019)	0.40	0.50	2.17	1.38	1.11	1.03	9.11	9.48	0.266
9(2020)	0.34	0.42	1.84	1.15	0.94	0.88	7.72	8.04	0.225
10(2021)	0.29	0.36	1.56	0.97	0.80	0.74	6.54	6.81	0.191
Total	13.14	15.23	95.95	82.24	18.74	17.48	153.92	160.21	

- The net present value for about 10 head of sheep in butana area under intervention of BIRDP = $18.74 - 13.14 = 5.6$ thousand SDG
- The net present value for about 10 head of goat in butana area under intervention of BIRDP = $17.48 - 15.23 = 2.57$
- The net present value for about 10 head of cattle in butana area under intervention of BIRDP = $153.92 - 95.95 = 57.97$
- The net present value for about 10 head of camel in butane in butane area under intervention of BIRDP = $160.21 - 82.24 = 77.97$ thousand SDG
- The benefit cost ratio for 10 head of sheep = $18.74/13.14 = 1.43$
- The benefit cost ratio for 10 head of goats = $17.48/15.23 = 1.15$
- The benefit cost ratio for 10 head of cattle = $153.92/95.95 = 1.6$
- The benefit cost ratio for 10 head of camels = $160.21/82.24 = 1.95$
- Capital pay back period in for case of camel = 8.69 years
- Capital pay back period for case of cattle = 13.74 years
- And capital pay back period for cases of sheep and goat = more than 15 years

Findings

- Based on the obtained results, it is noticed that the estimated benefit cost ratio have near values. However the results of this analysis showed that camel realized the highest ratio of 1.95 followed by cattle 1.6, sheep 1.43, and finally for goat 1.15 thus, subject to this measure all the four animal types are feasible in producing milk and small animals (the benefit/cost ratio is more than one)
- The net present value (NPV) are greater than zero for camel 77.97 cattle 57.97, sheep 5.6, and goat 2.57 it appears to be a good candidate for implementation.
- So we can arrange the priorities for investment in livestock in Butana area as follow :
- Camel, cattle, sheep and goat
- All the data used in this report are results from author's survey conducted during May and June 2013.



Sewloff



Thank YOU



Sewloff



Sewloff

