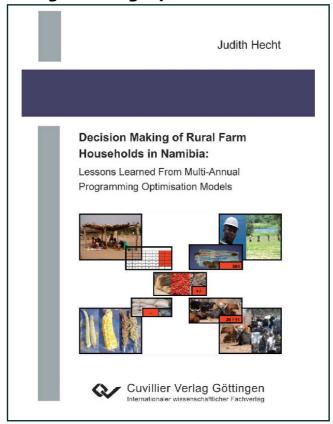


## Judith Hecht (Autor)

## Decision Making of Rural Farm Households in Namibia: Lessons Learned From Multi-Annual Programming Optimisation Models



https://cuvillier.de/de/shop/publications/569

## Copyright:

Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany

Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: https://cuvillier.de

Table of Contents iii

## **Table of Contents**

	ntroduction	1
	1.1 Relevance and problem	1
	1.2 Objective and organisation	2
<b>2</b> ]	Namibia and Its Kavango Region	5
	2.1 Namibia	5
	2.1.1 Location, land cover and distribution	5
	2.1.2 Economy and agriculture	8
	2.1.3 Socio-economic developments and future challenges	9
	2.2 Kavango Region	11
	2.2.1 Location	11
	2.2.2 From Colonisation via Apartheid to Independence	12
	2.2.3 Population, population growth and movements	13
	2.2.4 Ethnics, political structure and land tenure	14
	2.2.5 Infrastructure	16
	2.2.6 Biophysical conditions and native vegetation	17
	2.3 Livelihoods and farming systems	18
	2.3.1 Resource endowments	20
	2.3.2 Crop production	21
	2.3.2.1 Field sizes and yield levels	22
	2.3.2.2 Variable inputs	23
	2.3.2.3 Domestic and commercial utilisation patterns	23
	2.3.2.4 Labour	24
	2.3.3 Livestock production	25
	2.3.3.1 Cattle numbers	26
	2.3.3.2 Cattle management and performance	27
	2.3.3.3 Forage and grazing reserves	28

iv Table of Contents

2.3.3.4 Domestic and commercial utilisation patterns	29
2.3.3.5 Labour	30
2.3.4 Natural resource production and off-farm employment	30
2.3.4.1 Domestic and commercial utilisation patterns	31
2.3.4.2 Labour and off-farm employment	32
2.4 Major environmental and socio-economic threats	33
2.4.1 Environmental threats and driving forces	34
2.4.2 Socio-economic threats and impacts on farm households	35
2.4.3 Possible coping strategies	37
3 Theoretical Foundation and Modelling Approach	39
3.1 Farm household models	39
3.1.1 Chayanov's model of farm households	41
3.1.2 Barnum and Squire's model of farm households	43
3.1.3 Low's model of farm households	46
3.1.4 Summary of farm household models	50
3.2 Bio-economic models	51
3.2.1 Definition	51
3.2.2 Disciplinary focus	52
3.2.3 Time scale	53
3.2.4 Spatial scale	55
3.2.5 Summary on bio-economic models	58
3.3 A combined modelling approach	59
3.3.1 Decision making and its units	60
3.3.2 Theoretical foundation and implicit assumptions	63
3.3.3 Qualitative model descriptions	68
3.3.3.1 A schematic overview	68
3.3.3.2 Objectives and decision variables	70
3.3.3.3 Farm household activities	71

Table of Contents v

3.3.3.4 Biophysical components	73
3.3.3.5 Constraints	74
4 Empirical Data Collection and Parameter Levels	77
4.1 Research sites and empirical data collection	78
4.1.1 Data collection	79
4.1.2 Data processing and evaluation	80
4.2 Resource endowments	81
4.2.1 Land	81
4.2.2 Labour	83
4.2.2.1 Family labour endowments and their developments	83
4.2.2.2 Hired external labour	85
4.2.3 Capital and other assets	86
4.3 Crop production	88
4.3.1 Identifying most prevailing and other possible management	
options	89
4.3.1.1 Millet yields	91
4.3.1.2 Millet yield differentiation by cultivation modes	
and rainfall	93
4.3.1.3 Millet yield differentiation by soil quality classes	93
4.3.1.4 Millet yield differentiation by weeding frequencies	95
4.3.1.5 Resulting millet yields of different management options	95
4.3.2 Variable inputs and prices	97
4.3.3 Domestic utilisation patterns and nutrition deliveries	98
4.4 Livestock production	99
4.4.1 Identifying most prevailing and other possible	
management options	99
4.4.1.1 Cattle performance indicators	100
4.4.1.2 Cattle numbers	102

vi Table of Contents

4.4.2 Forage supplies and demands	103
4.4.2.1 Estimating biomass production on grazing areas	104
4.4.2.2 Estimating dry matter intake	106
4.4.3 Variable inputs and prices	107
4.4.4 Domestic utilisation patterns and nutrition deliveries	108
4.5 Natural resource production and off-farm employment	109
4.5.1 Estimating biomass production on natural resource areas	110
4.5.2 Domestic utilisation patterns	111
4.5.2.1 Thatching grass	112
4.5.2.2 Firewood and timber	113
4.5.3 Off-farm employment	114
4.6 Family labour requirements	116
4.6.1 Crop production	116
4.6.1.1 Literature review on labour inputs	117
4.6.1.2 Empirical evidence on labour inputs	118
4.6.1.3 Incorporating two weeding sessions and	
different cultivation modes	120
4.6.1.4 Incorporating gender differentiation	122
4.6.2 Livestock production	123
4.6.3 Natural resource production and off-farm employment	124
4.6.4 Daily maintenance	126
4.7 Objectives of peasant farm households	127
4.7.1 Theoretical foundation of traditional conjoint analysis (TCA)	128
4.7.1.1 General approach	128
4.7.1.2 Identifying factors and factor levels	130
4.7.1.3 Developing a census design	131
4.7.1.4 Evaluating stimuli	131
4.7.1.5 Estimating and aggregating utility levels	132

Table of Contents vii

4.7.1.6 Suitability, limitations and further developments	133
4.7.1.7 Application to developing countries	135
4.7.2 Empirically identifying objectives of peasant farm households	136
4.7.2.1 Identifying factors and factor levels	136
4.7.2.2 Developing a census design	137
4.7.2.3 Evaluating stimuli	139
4.7.2.4 Objectives of pesant farm households	139
5 Mathematical Model Formulations	143
5.1 Technical modelling aspects and rules	144
5.2 Resource endowments and assets	147
5.3 Crop production	151
5.3.1 Production patterns	152
5.3.2 Utilisation patterns and nutrition deliveries	153
5.4 Livestock production	156
5.4.1 Production patterns	157
5.4.2 Forage supplies and demands	159
5.4.3 Utilisation patterns and nutrition deliveries	160
5.5 Natural resource production and off-farm employment	161
5.5.1 Production patterns	162
5.5.2 Utilisation patterns	163
5.5.3 Off-farm employment	165
5.6 Labour requirements	166
5.7 Objective function	169
6 Scenarios and Discussion	175
6.1 Baseline scenario	175
6.1.1 Resource endowments	175
6.1.2 Crop production	178
6.1.3 Livestock production	182

viii Table of Contents

6.1.4 Natural resource production and off-farm employment	186
6.1.5 Impacts on the natural resource base	190
6.1.6 Summary of baseline scenario	194
6.2 A scenario based on changes of objective function elements	195
6.2.1 Resource endowments	196
6.2.2 Crop production	197
6.2.3 Livestock production	199
6.2.4 Natural resource production and off-farm employment	201
6.2.5 Impacts on the natural resource base	203
6.2.6 Summary of scenario 2	204
6.3 A scenario based on changes in policy conditions for natural	
resource usage	205
6.3.1 Construction of fee levels	206
6.3.2 Resource endowments	209
6.3.3 Crop production	210
6.3.4 Livestock production	212
6.3.5 Natural resource production and off-farm employment	213
6.3.6 Impacts on the natural resource base	215
6.3.7 Summary of scenario 3	216
6.4 A scenario based on changes in weighting factors of the	
objective function	217
6.4.1 Resource endowments	218
6.4.2 Crop production	219
6.4.3 Livestock production	221
6.4.4 Natural resource production and off-farm employment	223
6.4.5 Impacts on the natural resource base	224
6.4.6 Summary of scenario 4	225

ix

6.5 Summary and conclusions	227
6.6 Policy recommendations and future research	229
Summary	233
References	
Appendix	