

Spatial Bioeconomics of Subsistence Hunting

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ABSTRACT

The thesis reviews the significance and prevalence of hunting as a threat process in conservation, and then presents simple, general models exploring the stability of hunted populations, building upon fundamental principles of population dynamics. The adoption of a bioeconomic approach emerges from this consideration of human responses, rather than a conventional economic focus on maximising rents. The behaviour of a generic spatial bioeconomic model is explored to examine the influence of parameters, and to challenge the universality of conclusions based on previous, more specific models.

A case study of the subsistence hunting of ibex in the North Tien Shan mountains, along the Kazakh-Kyrgyz border, is developed to test the application of the generic bioeconomic model. Its practicability is tested by its ability to predict the outcome of a complex harvesting simulation, in which the macro behaviour of the system is an emergent property of numerous, low-level biological and behavioural mechanisms. This approach has parallels with the use of operating models in fisheries management, but the emphasis is not on producing a plausible virtual ecology rather than an accurate model for the North Tien Shan. The simple model can produce a reasonable ballpark estimate with limited data, or a highly similar outcome with perfect knowledge. There are substantial difficulties in characterizing real systems, however, and even if all parameters are known at any point in time, it may be difficult to predict behaviour in other states.

The final section explores the wider relevance of bioeconomics to conservation, showing that its quantification of incentives provides a basis for evaluating different management options involving people. Economic analysis reveals fundamental weaknesses of conventional biological approaches. Even if informational requirements are too severe for accurate quantification, incorporating human decision-making into models can provide exploratory tools for assessing the appropriateness of different management options. At present, economics is the only option for so doing.

ABBREVIATIONS

AC	Average Cost
ACTED	L'Agence d'Aide à la Coopération Technique et au Développement – French development NGO
ANN	Artificial Neural Network
AO	<i>Aiyl Okmotu</i> – Kyrgyz village council
BM	Biomass
CA	Central Asia
CI	Confidence Interval
CPUE	Catch Per Unit Effort
CV	Coefficient of Variation
DFID	Department For International Development – UK development agency
GA	Genetic Algorithm
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Global Information System
ICAD	Integrated Conservation And Development
ING	Individual-based neural network genetic algorithm
INTAS	International Association – EU funding body for cooperation research with the Former Soviet Union
IUCN	World Conservation Union
LH/RH	Left-/Right-Hand
LHS/RHS	Left-/Right-Handside
MAS	Multi-Agent System
MC	Marginal Cost
MR	Marginal Revenue
MSY	Maximum Sustainable Yield
NABU	Naturschutzbund – German conservation NGO
nD	n -dimensional
NGO	Non-Governmental Organisation
NTFP	Non-Timber Forest Product
NTS	North Tien Shan
PA	Protected Area
PPP	Purchasing Power Parity
PRA	Participatory Rural Assessment
S&D	Supply and Demand
SD	Standard Deviation
SLT	International Snow Leopard Trust
UN	United Nations
UNDP	United Nations Development Programme
WWF	Worldwide Fund for Nature

TABLE OF CONTENTS

CHAPTER 1: HUNTING AS A THREAT	16
1.1 Background	16
1.1.1 Anecdotal historical evidence	16
1.1.2 Systematic comparative evidence	17
1.1.3 Contemporary field observations	18
1.1.4 Why now?	19
1.2 Thesis structure and aims	20
CHAPTER 2: EXPLORING SUSTAINABILITY AND THE BIOECONOMIC APPROACH	21
2.1 Stability of exploited populations	21
2.1.1 Population regulation and density	21
2.1.2 Hunting and population regulation	23
2.1.3 Exploratory spatial models	25
2.2 Bioeconomics	28
2.2.1 Shape of the open access supply curve	31
2.2.2 Ownership and supply	33
2.2.3 Supply and demand dynamics	34
2.3 Conclusions	37
CHAPTER 3: A GENERIC SPATIAL BIOECONOMIC MODEL	39
3.1 Equations	39
3.2 Implementations	41
3.3 Behaviour	42
3.3.1 Form of prey density – distance relationship	42
3.3.2 Width of the hunted region	43
3.3.3 Total offtake	47
3.3.4 Shape of supply curve	49
3.3.5 Local extinction	50
3.3.6 Discounting and monopoly harvesting	52
3.3.7 Time-limited case	54
3.4 Implications	56
3.5 Complications	57
3.5.1 Multiple prey species	58
3.5.2 Alternate land uses	63
3.6 Conclusion	65

CHAPTER 4: NORTH TIEN SHAN CASE STUDY	68
4.1 Introduction	68
4.2 Background to conservation and hunting in Central Asia	68
4.3 Background to North Tien Shan	75
4.3.1 Suitability as a case study	75
4.3.2 Stakeholder population	77
4.3.3 Economic overview and trends	78
4.4 Village-based research	80
4.4.1 Information needed for model and existing sources	80
4.4.2 Methods	81
4.4.2.1 Hunter interviews	81
4.4.2.2 Household survey	81
4.4.2.3 Analysis	83
4.4.3 Information from interviews	85
4.4.4 Results of household survey	87
4.4.4.1 Use of <i>Aiyl Okmotu</i> records	87
4.4.4.2 Wealth and income	89
4.4.4.3 Opportunity cost	95
4.4.4.4 Meat consumption and demand	96
4.5 Conclusions	101
CHAPTER 5: DEVELOPMENT OF THE SIMULATION MODEL	106
5.1 Role of the simulation	106
5.2 Data	107
5.3 Approach and methods	108
5.3.1 General	108
5.3.2 Vital rates	109
5.3.3 Hunter behaviour	109
5.4 Model components and structure	111
5.4.1 Time and seasonality	112
5.4.2 Weather	113
5.4.3 Landscape	113
5.4.3.1 Physical characteristics	114
5.4.3.2 Secondary physical characteristics	114
5.4.3.3 Forage properties	120
5.4.3.4 Ibex perceptions	120
5.4.4 Animals	121
5.4.4.1 Herd properties	121
5.4.4.2 Individual properties	121
5.4.5 Hunters	122

5.4.5.1 ANN structure	123
5.4.5.2 GA structure	124
5.5 Model events and processes	124
5.5.1 Biological processesx	124
5.5.1.1 Forage growth	124
5.5.1.2 Forage consumption and condition gain	125
5.5.1.3 Forage depletion and population limitation	127
5.5.1.4 Routine herd movements	127
5.5.1.5 Herding behaviour	130
5.5.1.6 Growth	131
5.5.1.7 Male reproductive behaviour	131
5.5.1.8 Female reproduction and post-natal mortality	132
5.5.1.9 Winter mortality	132
5.5.1.10 Vital rates	133
5.5.2 Hunting processes	137
5.5.2.1 Searching	137
5.5.2.2 Sighting herds	141
5.5.2.3 Disturbance	143
5.5.2.4 Approaching a herd	144
5.5.2.5 Prey selection	145
5.5.2.6 Performance and effort response	146
5.5.2.7 Final form of GA	146
5.5.2.8 Results of training and final structure of ANNs	149
5.6 Model Outcome	151
5.6.1 Analysis	151
5.6.2 Characteristics of single runs	152
5.6.3 Multiple runs	155
CHAPTER 6: APPLYING THE SUPPLY & DEMAND MODEL TO THE NORTH	160
TIEN SHAN	
6.1 Overview	160
6.2 Structure of the S&D model	161
6.2.1 Supply & Demand equations	161
6.2.2 Dynamics	163
6.2.3 Stochasticity	164
6.2.3.1 Overview	164
6.2.3.2 Sources of stochasticity	165
6.3 Parameterisation	167
6.3.1. A priori models	167
6.3.1.1 Form of equations	167

6.3.1.2 Spatial structure	168
6.3.1.3 Biological parameters	168
6.3.1.4 Economics/hunting	169
6.3.1.5 Stochasticity	170
6.3.2 Fitted model	173
6.3.2.1 Method and data	174
6.3.2.2 Meat weights	177
6.3.2.3 Hunting cost	179
6.3.2.4 Population growth	182
6.3.3 Sampled model	183
6.3.3.1 Method and data	184
6.4 Sensitivity to socio-economic parameters	187
6.4.1 Inelastic demand	187
6.4.2 Rate of industry adjustment	188
6.4.3 Unlimited number of hunters	188
6.4.5 Higher opportunity cost of time	188
6.5 Results	189
6.5.1 Behaviour of S&D model	189
6.5.2 Comparison to simulation	195
6.5.3 Sampling and forecast accuracy	201
6.5.4 Alternative socio-economic assumptions	207
6.6 Relevance to the North Tien Shan	212
6.6.1 Present situation	212
6.6.2 Future prognoses	213
6.7 Conclusion	213
CHAPTER 7: MANAGEMENT INTERVENTION FRAMEWORK	217
7.1 Introduction	217
7.1.1 Poverty and conservation in the developing world	217
7.1.2 Introducing plurality	220
7.1.3 Incentive-based framework	221
7.2 Framework structure	222
7.3 Agents	223
7.4 Management interventions	224
7.4.1 Incentive-based tactics	226
7.4.1.1 Sticks	226
7.4.1.2 Diversions	226
7.4.1.3 Carrots	227
7.4.2 Strategies	228
7.4.3 Considerations	229

7.4.3.1 Number of agents and ownership structure	229
7.4.3.2 Demand	231
7.4.3.3 Additional secondary impacts	238
7.4.3.4 Legal and institutional framework	238
7.5 Evaluating strategies	239
7.6 NTS example	242
7.6.1 Commercial hunting model	242
7.6.2 Management setting	245
7.6.3 Management options	246
7.6.3.1 External enforcement	246
7.6.3.2 Income generation	247
7.6.3.3 Conservation contracts	249
7.6.3.4 Local management cooperative	250
7.6.4 Outcome	251
7.7 Other measures – targeting attitudes	255
7.8 Discussion	256
CHAPTER 8: CONCLUSIONS	258
8.1 Role of conservation science	258
8.2 Use of economics in conservation	260
8.3 Objections to economics	262
8.4 Practical problems with economic models	264
8.5 Future directions	266
8.5.1 Tactical models	266
8.5.2 Development of quantitative behavioural models	268
8.5.3 Inclusivity	269
8.5.4 Sustainability	270
ACKNOWLEDGEMENTS	271
REFERENCES	273
APPENDICES	290
Appendix 2-1: Density dependence and stability	290
Appendix 2-2: Competitive equilibrium and externalities	292
Appendix 3-1: Spatial effort distribution and offtake	296
Appendix 3-2: Technology trap	297
Appendix 3-3: Hunting and travel combined	300

Appendix 4-1: Hunter interview questions	301
Appendix 4-2: Household survey form and notes	303
Appendix 5-1: Herds sighted during Chong Kemin field survey	307
Appendix 5-2: Derivation of sighting angle according to basic principles of geometry	308
Appendix 6-1: Parameter estimates and bootstrap CIs in the sampled models	310

LIST OF TABLES

3-1. Default parameters for the unbounded, linear implementation of the generic spatial bioeconomic model.	41
4-1. Contingency tables of numbers of species by taxon (a) and by hunting category (b) confirmed to occur in at least one protected area or not confirmed as such.	74
4-2. Number of households surveyed by ethnicity, in each village and amongst hunters interviewed.	82
4-3. Relationship between household characteristics recorded during survey and Aiyl Okmotu records; means for the two datasets and results of linear regression.	87
4-4. Number of households owning or producing and estimated values of various items, for all 126 households surveyed (120 randomly selected and 6 hunters).	90
4-5. The percentage of households reporting incomes from each economic sector, the contribution of that sector to the sum of all incomes reported in the sample, the percentage of households for which each sector represented the major source of income, and the average income of households deriving their major source of income from each sector.	91
4-6. Value of the total reported production of each agricultural product, percentage of the production that is sold, the number of households (of 126) reporting the product, and the percentage of those households which sell some part of their production.	91
4-7. The number of households (of 126) reporting consumption of each meat type, the median equivalence ration (i.e. equivalent weight of meat / 10 kg mutton), market price and median consumption ratio (wrt mutton).	99
4-8. Specific parameter used in later models derived directly from household survey and hunter interview information.	105
5-1. Model equations and origin of parameters. See table 5-2 for key to notation.	115
5-2. Algebraic symbols for variables and named parameters.	118
5-3 Default mid-month snowlines throughout year.	118
5-4. Default insolation values for cells of varying slope and aspect.	119
5-5. Reductions in insolation due to SE/SW shading, depending on angle of shading and cell aspect (for SE / SW shading respectively).	119
5-6. Summary of hunter decisions.	139
5-7. Probability of herd location being of type 1, 2 or 3 in cells with different grain values.	145
5-8. Meat weight (kg) of ibex in different age- and sex-classes. No systematic data on either body or meat weights were found.	146
5-9. Mean yearly number of captures by 200 hunters during the second 200 years of a 400-year run of the hunting model with no hunting mortality and fixed ibex populations of 60, 300, 1800, and 3000.	151
5-10. Median ibex population, number of captures, unit meat cost, hunting effort and total meat production during 5000 years at stochastic equilibrium in 25 200-year runs.	155
6-1. Algebraic symbols for variables and named parameters referenced in chapter 6.	162
6-2. Final S&D models and parameters.	171
6-3. Results of meat weight model fitting.	177
6-4. Results of herd size model fitting.	179
6-5. Results of capture cost model fitting.	180

6-6. S&D model statistics in comparison to the simulation model.	198
6-7. Equilibrium extinction rates and probability of extinction during decline from carrying capacity for variations on the fitted model under various alternate socio-economic assumptions.	207
7-1. Specific characteristics and considerations for different tactics.	234
7-2. Equations and parameters used in the commercial hunting model.	244
7-3 Yearly and daily profit incentives to hunt casually and commercially at different ibex population levels.	244
7-4. Approximate costs involved in enforcement through permanent guard posts, estimated from known costs of vehicles and salaries, and similar estimates given by Kyrgyz anti-poaching officers (Pala 2003).	246
7-5. Expected costs of enforcement penalties on commercial and casual hunters.	246

LIST OF FIGURES

2-1 (after Sinclair 1989).	22
2-2. A population has been reduced from K to a new equilibrium density, N^* .	22
2-3. Examples of variation in $q(x)$ for a number of simple grid foraging simulations.	26
2-4. Equilibrium catchability, q_g ($=CPUE/N$), (a), and prey growth rate (b) versus total prey population size in a run of the effort distribution model.	27
2-5. Migration, population and hunting effort across the 10-cell array for an example of the the 2-species version of the effort distribution model.	28
2-6. Clark's supply curve (price P against yield Y) is actually the AC curve for harvesting from a non-spatial population with logistic growth and constant catchability (i.e. the Schaefer model).	32
2-7. AC curve for hunting (solid line) with four possible demand curves, representing high or low, and elastic or inelastic demand.	33
2-8. Discounted MC curves for harvesting from a non-spatial population for different discount rates δ .	34
2-9. Phase-plane behaviour of supply and demand diagram for an open access renewable resource.	35
2-10. Examples of possible trajectories for different market conditions.	36
3-1. Shapes of the plot of prey population density, N , vs distance, x , for different values of a) C , b) H , c) B and T .	43
3-2. Equilibrium prey density, N , vs distance, x , in the presence of dispersal, using default parameters in the unbounded linear implementation.	44
3-3. Prey density and net immigration and growth rates with distance from the hunter origin under default parameters.	46
3-4. N vs x profiles for various values of M .	47
3-5. Sensitivity of the width of the hunted region, x_H , and the total offtake at equilibrium, in response to changes in individual parameters.	48
3-6. Equilibrium offtake (animals per yr), maximum distance travelled by hunters and global prey population density (% of maximum) vs. C in the 2D island implementation under default parameters.	49
3-7. Effects of model parameters on the shape of the AC curve. Both plots illustrate the default AC curve, and that produced when travel costs are insignificant ($T=0.001$).	50

default AC curve, and that produced when travel costs are insignificant ($T=0.001$).	
3-8. N vs. x with local extinction.	51
3-9. Cost curves for the default parameters in the 2D island implementation, and for the same set of parameters with the inclusion of population density and immigration extinction thresholds of 10% and 5% K respectively.	51
3-10. N vs. x for different (constant) values of marginal cost, MC.	53
3-11. Cost curves for individual and monopoly foraging under the default parameters of the 2D island implementation with $M=0$.	54
3-12. N versus x for a resilient and susceptible species in the two species model, and for the susceptible species in isolation.	60
3-13. Supply (AC) curves for both species together, for the susceptible species as a component of the joint supply, and for the susceptible species alone.	60
3-14. Forms of N vs x curves for a 2 species system.	62
4-1. Growth in area (km^2) of the Central Asian Protected Areas system over time; by type of area (a), and predominant habitat type (b).	70
4-2. Pie charts showing the composition by ecosystem type of all Central Asian territories, of land within the PA system, and of the PA system excluding Prohibited Zones, based on data from the INTAS project GIS.	71
4-3. Number of species known to occur in different proportions of Central Asian PAs; by taxonomic group (a), M-mammals, R-reptiles, F-fish, B-birds, and classified according to whether or not they are commonly hunted.	73
4-4. NTS study area.	76
4-5. Schematic consumptions curves.	84
4-6. If there is no intrinsic preference between meats X and Y, then the XY preference curve must be symmetrical in the line $Y=X$ (and the substitutability of the two meats is given by the curvature of the curve).	85
4-7. Number of household members in Aiyl Okmotu records versus number reported during household survey.	88
4-8. Area of land owned (ha) reported during household survey versus Aiyl Okmotu records.	88
4-9. Per capita wealth versus per capita annual income (som) of households surveyed.	92
4-10. Distribution of reported per capita income and wealth by village; S – Semyonovka, G – Grigorevka, C – Chon Sary Oy, K – Kara Oy.	93
4-11. Distribution of reported per capita income and wealth by ethnicity, with hunters included for comparison; A – Asiatic, E – European, H - hunter.	94
4-12. Minimum daily opportunity cost versus annual household income (som).	95
4-13. Distribution of minimum opportunity costs for villagers selected for the survey at random(V) and hunters (H).	95
4-14. Distribution of number of unemployed or self-employed males of hunting age amongst randomly selected villagers (V) and hunters (H).	96
4-15. Reported total per capita annual consumption of meat (kg) by village and ethnicity with hunters included for comparison.	97
4-16. Reported total per capita annual meat consumption (kg) versus per capita annual income (som).	98
4-17. Mean per capita annual consumption (kg) of different types of meat amongst Asiatics ($n=76$), Europeans ($n=44$) and hunters ($n=6$).	98
4-18. The distributions of equivalence estimates (i.e. weight of meat equivalent to 10 kg mutton) by ethnic/hunter group, and log equivalence ratios versus log consumption ratios for beef, chicken and fish.	100

4-19. Posterior probabilities of the number of households in the study region owning guns, based on Bayesian inference and a uniform prior.	103
5-1. Structure of the simulation.	112
5-2. Forage growth in a cell with 100% forage cover and insolation = 1, in the absence of snow cover and weather effects: a.) change in biomass density (BM), forage quality and forage value throughout the year in the absence of ibex; b.) BM, forage quality and value with continual foraging by 12 ibex; c.) cumulative energy intake and condition gain for one of the 12 ibex with metabolic rate, MR = 12.	126
5-3. Distribution of ibex herds in early spring (a.) and mid summer (b.) in the absence of hunting.	129
5-4. Mean herd size vs total population size for a total of 4200 years of simulation output.	131
5-5. Illustrative winter survivorship probabilities vs end-of-year condition for normal and senescent individuals, when winter weather = 0.	133
5-6. Vital rates by sex and age class for 50 years of the biological model at stochastic equilibrium: a.) winter survivorship; b.) net fecundity (i.e. number of lambs weaned per head).	134
5-7. Population growth and condition: a.) population size of 100 years of a simulation initiated with 60 ibex in 10 herds, open circles show population size for first 50 years of a run in which weather variable are set to 0, so only demographic stochasticity remains; b.) average condition versus population size during the 100-year run.	135
5-8. Population sex-, age-composition during 50 years at stochastic equilibrium; males above females.	136
5-9. Hunter routes. Major routes are black, minor routes grey.	137
5-10. Structure of ANNs.	140
5-11. Schematic diagram of strategy selection and evolution.	148
5-12. Components of success during 100-year adaptation of hunting strategy with 500 hunters and 1800 ibex: a.) annual number of approach decision evaluated and approaches made; b.) number of kills and average meat weight per kill on LH axis, and total number of herd sightings on LH axis.	150
5-13. Changes in annual cost and offtake within a 30-year period of the simulation at equilibrium.	152
5-14. Sex-, age-composition of ibex population (a) and offtake (b) during a 100-year period of the simulation in which hunting mortality is introduced after 50 years.	153
5-15. Changes in the simulation number of ibex and hunters over time during (a.) the entire length of a run which went extinct on approach to equilibrium, and (b.) 200 years of a run after reaching equilibrium.	154
5-16. Population size, offtake and unit cost during 5000 years at stochastic equilibrium in 25 200-year runs.	156
5-17. Offtake versus population size for the first six of the equilibrium runs.	157
5-18. Unit production cost versus population size in equilibrium runs of the simulation and in runs which went extinct on approach to equilibrium.	158
5-19. Population growth versus population size in equilibrium runs of the simulation (grey circles) and in runs which went extinct on approach to equilibrium (black diamonds).	159
6-1. Flow of causality in the stochastic dynamic model, and the points at which stochasticity enter the system.	165
6-2. Data from 21 200-yr runs of simulation on which fitted S&D model was based.	175
6-3. Goodness-of-fit plots for each of the three parameters of the selected model for	178

meat weight.	
6-4. Cumulative frequency plot of transformed meat weight residuals versus transformed residual model.	178
6-5. Average simulation population growth vs population growth under the deterministic fitted model.	179
6-6. Relative variable time per kill residuals (i.e. residual divided by expected variable time given by the deterministic equation) versus start-of-year population size and hunting effort.	181
6-7. Cumulative frequency plots of real relative variable time residuals and relative residual model.	182
6-8. Cumulative frequency plots for real growth residuals (solid line) and model residuals (broken line) for various population size classes, and finally for all data together (bottom right corner).	183
6-9. CV of estimate of total herd number versus number of herds observed in Reading <i>et al.</i> 's (1997, 1999a,b) surveys of wild ungulates in Mongolia.	185
6-10. Four output variables from the deterministic individual-based a priori S&D model; offtake – Q (animals), unit meat cost – C (som kg ⁻¹), population size – N (animals), hunting effort – E (hunter grps).	190
6-11. Deterministic and stochastic equilibria, and stochastic extinction behaviour of the a priori S&D models.	191
6-12. Deterministic and stochastic behaviour of the fitted S&D model.	193
6-13. Fitted S&D model results with dotted lines showing expected offtakes for effort levels corresponding to 50, 100, 150, . . . , 500 active hunter groups respectively (from left to right).	194
6-14. Schematic diagram interpreting deterministic fitted results in 3D.	194
6-15. Variable times per kill predicted by the stochastic fitted model (grey points) and the simple deterministic fitted model, not adjusted for the effects of effort, i.e. the deterministic form given in table 6-2 (black line).	195
6-16. Illustrative results of sampled models.	196
6-17. Offtake versus population size for the first six 200-year samples of the fitted model at equilibrium.	200
6-18. Comparison of cumulative frequency curves for variable times per kill and ibex population growth from 25 200-year runs of the simulation at equilibrium (see 6.3.2.1) and the fitted model using input data from 10000 sampled years of the simulation at equilibrium.	201
6-19. Predicted equilibrium offtake versus predicted equilibrium population size in the sampled models.	202
6-20. Predicted equilibrium number of herds versus estimated meat weight / H in the sampled models.	202
6-21. Predicted number of herds at deterministic equilibrium for sampling exercises carried out at different population sizes, ~2000, ~1000 and ~500 from top to bottom respectively, and 95% CIs on the deterministic predictions determined by the manager's and global bootstrap methods (see 6.3.3.1), left and right respectively.	203
6-22. Predicted population size at deterministic equilibrium, and 95% CIs on the deterministic predictions.	204
6-23. Extinction rate at equilibrium versus probability of extinction on approach to equilibrium from carrying capacity for the various versions of the sampled model.	206
6-24. S&D model results under various alternative socio-economic assumptions applied to the fitted model.	208

7-1. Indicative schematic showing tactics likely to be effective in relation to axes correlated with the number of agents and/or the diffuseness of resource ownership, and the strength of preference for the product derived from the resource and/or the demand for it amongst the group of agents in question.	233
7-2. Schematic of the process of strategy evaluation and selection.	241
7-3. N, C, Q and E from the deterministic commercial hunting model with rate of interest set at 20% (solid lines) plotted next to the results of the (a priori) casual hunting model (broken lines) for comparison.	245