

DISSERTATION TITLE

A National Evaluation of Sustainability Indicators

DEGREE

Magister Institutionis Agrarier: Sustainable Ecological Management

STUDENT

Lingela Gratitude Vuyani

SUPERVISOR

Prof. A.S. van Jaarsveld (University of Pretoria)

Co-SUPERVISOR

Mr. D. Fairbanks (University of Pretoria)

Date: June 2000

CONTENTS

1. Introduction	1
1.1 Measuring sustainable development	4
1.2 The need for indicators of sustainable development	6
2. Methods	8
3. Results	10
3.1 Social sustainable development indicators	10
3.1.1 Negative indicators	10
3.1.2 Positive indicators	17
3.1.3 Negative and positive indicators	19
3.2 Economic sustainable development indicators	23
3.2.1 Negative indicators	23
3.2.2 Positive indicators	25
3.2.3 Negative and positive indicators	27
3.3 Environmental sustainable development indicators	30
3.3.1 Negative indicators	30

3.3.2 Positive indicators	32
3.3.3 Negative and positive indicators	34
4. Social and economic sustainable development indicators	37
4.1 Negative correlation	37
4.2 Positive correlation	37
5. Environmental, social and economic sustainable development indicators	38
5.1 Negative correlation	38
5.2 Positive correlation	39
6. Discussion	41
7. Conclusion	48
References	51
Appendix 1	58
Appendix 2	67
Appendix 3	100
Appendix 4	101

LIST OF FIGURES

Figure 1. Correlation between the negative social indicators and the indices of social sustainable development	15
Figure 2. Representation of the negative social sustainable development indicators for South African magisterial districts	16
Figure 3. Representation of the positive social sustainable development indicators for South African magisterial districts	17
Figure 4. Correlation between the positive social indicators and indices of social sustainable development	18
Figure 5. Representation of the social sustainable development indices for South African magisterial districts	17
Figure 6. Diagram illustrating the co-variation between negative and positive indicators, and indices of social sustainable development for South African magisterial districts	20
Figure 7. Correlation between the negative economic indicators and indices of economic sustainable development.....	23

Figure 8. Representation of the negative economic sustainable development indicators for South African magisterial districts24

Figure 9. Representation of the positive economic sustainable development indicators for South African magisterial districts26

Figure 10. Correlation between the positive economic variables and indices of economic sustainable development26

Figure 11. Representation of the economic sustainable development indices for South African magisterial districts27

Figure 12. Diagram illustrating the co-variation between negative and positive indicators, and indices of economic sustainable development for South African magisterial districts... ..28

Figure 13. Representation of the negative environmental sustainable development indicators for South African magisterial districts... ..30

Figure 14. Correlation between the negative environmental indicators and indices of environmental sustainable development31

Figure 15. Representation of the positive environmental sustainable development indicators for South African magisterial districts... ..32

Figure 16. Correlation between the positive environmental indicators and indices of environmental sustainable development33

Figure 17. Representation of the environmental sustainable development indices for South African magisterial districts... ..34

Figure 18. Diagram illustrating the co-variation between negative and positive indicators, and indices of environmental sustainable development for South African magisterial districts.....35

LIST OF TABLES

Table 1. A correlation matrix between social, economic and environmental indicators for South African magisterial districts... ..	11
Table 2. The ranked values, positive and negative social sustainable development indicators and indices of social sustainable development for South African magisterial districts... ..	22
Table 3. The ranked values, positive and negative economic sustainable development indicators and indices of economic sustainable development for South African magisterial districts... ..	26
Table 4. The ranked values, positive and negative environmental sustainable development indicators and indices of environmental sustainable development for South African magisterial districts... ..	36



ACKNOWLEDGEMENTS

My sincere appreciation to the support received from the people at the University of Pretoria in South Africa, at the Port Elizabeth Technikon in South Africa and to the people at the Tokyo University of Agriculture and Technology in Japan. This study was made possible by the financial support received from the Foundation for Research Development and the University of Pretoria.

ABSTRACT

The presents study reflects on the multidimensional nature of sustainable development and recognizes the interdependence of the economic, social and the environmental dimensions. A total of 40 variables are used to address the meaning of sustainable development at a local level in South Africa. The relationship between indicators and their use in measuring the broad concept of sustainable development is explored. Attempt to capture the spatial dimension in the evaluation of sustainable development indicators is made.

This study shows an association between districts characterized by low percentage of functional literacy and poverty gap. Districts with high poverty gap have poor access to water and latrine facilities and high unemployment rate. Further districts with high percentage functional literacy tend to have access to latrine and water facilities. There is a positive association between an increasing urban-rural spread and population density, percentage functional literacy, and access to latrine and water services, community services and the mining intensity index. As expected districts characterized by a high population growth rate have high population density and high unemployment rate. Districts with high population growth rate also have poor access to water facilities.

Districts with high poverty gap and unemployment rate tend to be associated with low amounts of pesticide and fertilizer application. Districts with large arable land per capita are associated with low amounts of fertilizer and pesticide application, and low intensity

of cattle production. Districts with large protected areas show high population growth rate and poverty gap. Districts with low unemployment rate are associated with mining and quarrying activities. Also districts with high mining intensity index show a positive association with desirable social conditions such as the increase in percentage functional literacy, access to water and latrine water facilities.

On the overall indices of social sustainability indicate a poor state of social sustainable development in many South African magisterial districts in the Eastern Cape, KwaZulu Natal, Gauteng and Northern Province. The overall pattern of economic sustainable development shows many economically active districts in Western Cape, Free State and Gauteng Province. However many districts in the Eastern Cape, KwaZulu Natal, Northern Province, Northern Cape and some in Mpumalanga Province indicate low economic activity. Many districts show a pattern of high environmental sustainability, but districts in Eastern Cape, KwaZulu Natal, Gauteng and some in Mpumalanga and Northern Province indicate a poor state of environmental sustainability.