APPENDIX 1.1: EXAMPLE OF THE "OXFORD ECOLOGY TRAIL" GUIDE

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BIRDS IN TOWN

Birds often thrive in towns because there are many trees, buildings and even nest boxes for them to breed in. In the country, many birds die of cold and starvation in a hard winter, but in towns food is often plentiful on bird tables and rubbish tips. The 'heat island' [N14] of a town is often several degrees warmer than the nearby countryside especially near heated buildings. Breeding cycles of wild birds are mainly controlled by day-length so the extra light in city centres enables some birds to breed all the year round.

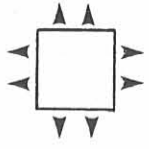
ASPECT OF TREE TRUNKS

South-facing sides of tree trunks and stonework, in the northern hemisphere, tend to be barer because more solar radiation is received per unit area. Heat from the sun evaporates any water rapidly. The drought and the heat often make conditions too extreme for plants to grow, apart from a few hardy lichens. Near the base of the tree where water can rise by seeping up the surface of the trunk (capillarity) it will be damper encouraging growth.

On both bark and stonework the damper or north-facing side is often coated with mosses or with a green powdery covering of microscopic single-celled algae such as Pleurococcus. Drier, south-facing surfaces are bare or have some lichen. However, where trunks are shaded by other trees for most of the year the south sides stay moist and also become green. Where water is prevented from trickling down a trunk by being sheltered by a branch above, bark may be dry and bare even on the north side. The side facing the prevailing wind (west or south-west in Britain) will be dried rapidly on a fine day but soaked by driving rain on a wet one. On the rest of the walk bear in mind how aspect may influence plant cover.

NORTH. Damper so more moss and richer growth of flowering plants. Cooler as no direct sunlight

WEST. Exposed to prevailing wind and rain. Warm and dry on fine days.



EAST. Cool and moist as water slowly evaporates during morning.

SOUTH. Drier and warmer. More lichens and fewer flowering plants because of full exposure to midday sun and wind.

Figure 1 Aspect of walls

Grassland

4. Christ Church Meadow

Ahead is the Broad Walk, a sandy, gravel path running along the northern edge of Christ Church Meadow. Stop near the far end of the college building. Several different types of grassland are visible from here. Areas of contrasting vegetation include:-

a. Lawn between the college and the Broad Walk.
b. Grass verge between the Broad Walk and the sports field ahead to your left.
c. Christ Church Meadow to the right (south) of the Broad Walk.
d. Sports field (Merton Field) ahead to your left.
e. The edge of Merton Field near the railings.
f. Plants growing on the Broad Walk itself.

Without leaving the path try to account for the different appearance of the grassland in each area. What probably controls the height of plants here?

Compare the variety of different plants present in each area and also the size and shape of these plants. Which grassland seems to have the greatest variety of species? Which has the fewest?

What controls the types of plant found in each area?

Christ Church Meadow has been left with minimum management for centuries so why has succession [N9] not occurred to produce open woodland, the climax community [N5] for this area?

APPENDIX 1.2: EXAMPLE OF THE "GEOLOGY AT HARTLAND QUAY" TRAIL GUIDE

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STARTING THE WALK. Open out the cover to reveal the map locating the stops on the walk. The extended outside cover gives a panorama of Warren Beach from the beginning of the walk.

1. THE SLIPWAY Panorama of Warren Beach

The spectacular cliffs of Warren Beach are the result of Atlantic storms. At high tides the waves erode the base of the cliffs eventually causing parts of the undercut cliff to collapse. This has exposed a clear section through typical rocks of the district. The rocks have a stripy appearance and are folded. Notice two types of fold. In the centre of the bay are a series of tight (zigzag or chevron-type) folds. At the sides of the bay are more gentle (open) folds.

Have the folds affected the way the cliffs have eroded? Consider this when you walk along the beach. The question can be picked up again at stop 7.

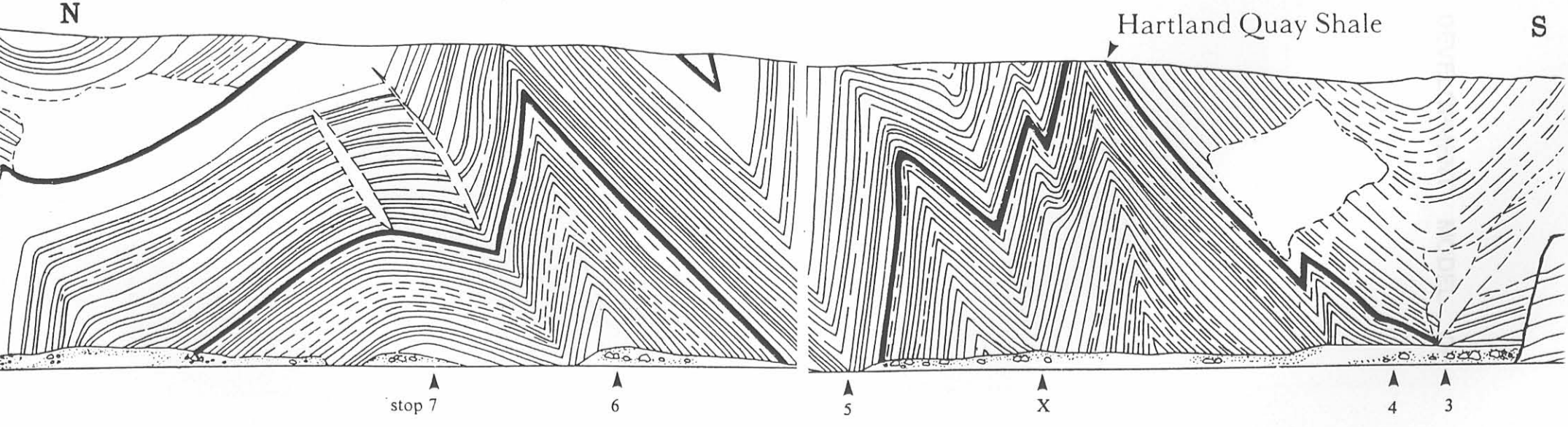
Folding in the cliffs

The folding in the cliffs as viewed from the Slipway is impressive, particularly when it is remembered that these beds were originally laid down in near-horizontal layers. To get a clearer idea of the degree and complexity of the folding involved, select a prominent bed and follow it by eye across the cliff face as it is folded up and down. Do this and then check your ideas against figure 8.

The British Geological Survey (Edmunds and co-workers, 1979) in their description of this area, traced the detailed path of each bed of rock in the Warren Beach cliff (figure 8). The 'Hartland Quay Shale', shown as the lowest band emphasised in black in their sketch, is an easily identifiable horizon, and demonstrates the folding well. Shale is a fine-grained mudstone, which splits easily along closely-spaced bedding surfaces and can be seen from several of the stops on the walk (figure 8).

Now look at the folds more closely. Note that there are smaller, 'parasitic', folds on the limbs of the larger structures. There is a good example above the X marked on figure 8. The question of how folds develop and change perpendicular to the beds is one of the more complex concepts currently of interest to structural geologists.

Figure 8. An accurate sketch of the beds exposed in the Warren Beach cliff (reproduced with permission of the Director of the BGS. Crown/NERC copyright reserved)



APPENDIX 2: COMPREHENSIVE TRAIL DEVELOPMENT MODEL OF BEWSHER & HUGO

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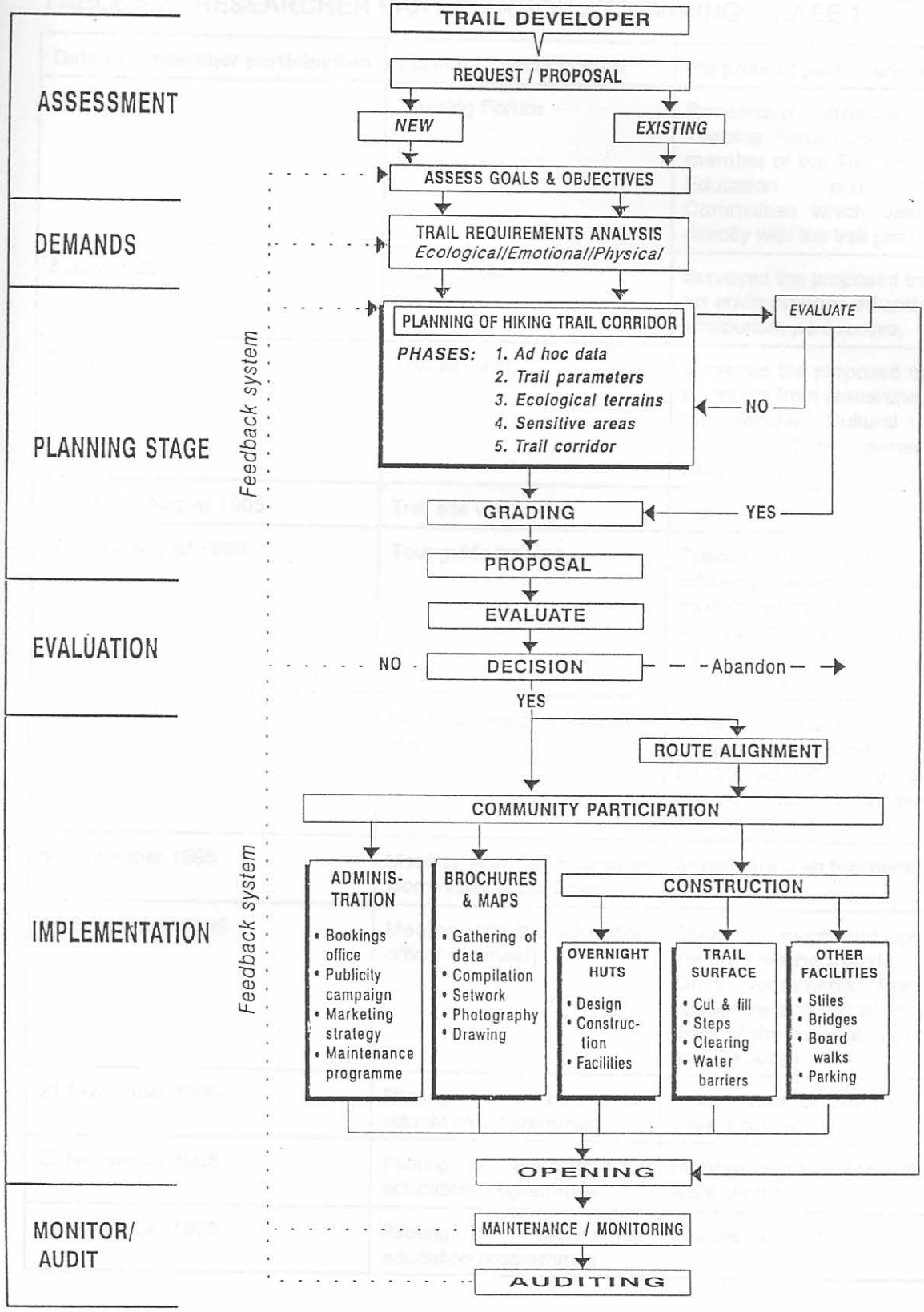
COMPREHENSIVE TRAIL DEVELOPMENT MODEL



Adapted from: Centre for Ecotourism, University of Pretoria (MLH-97)

APPENDIX 3: RESEARCHER PARTICIPATION

TABLE 6.2 RESEARCHER PARTICIPATION AT TSWAING: PHASE 1

Date of researcher participation	Format of participation	Purpose of participation
May 1995	Tswaing Forum	Researcher introduced to the Tswaing Forum and became a member of the Tourism and the Education and Training Committees which dealt more directly with the trail planning.
8 July 1995	Trail site visit	Surveyed the proposed trail from an environmental education and ecotourism perspective.
26 July 1995	Trail site visit	Surveyed the proposed trail with the inputs from researchers from the Natural Cultural History Museum (The owner and developer)
11 and 12 August 1995	Trail site visit	Follow-up surveying
28 to 30 August 1995	Tour guide training	Trained tour guides in the following aspects; archaeology, modern history, geology, animals, ecosystems and plants of Tswaing and basic communication skills.
August 1995	Development of the teacher guide	Develop the teacher's guide with environmental education activities for the educational officer and teachers from which they can choose
8 September 1995	Meeting with the Education Committee at the Crater	Assess the draft teacher's guide
14 September 1995	Meeting with the education officer (Ishmael)	Obtain comments and inputs into the draft teachers guide. Obtain comments from two specialists at the Museum on the draft of the manual (van Coller and De Jong)
21 November 1995	Piloting of environmental education programmes	Programmes for Grades 5, 6 and 7 were piloted
23 November 1995	Piloting of environmental education programmes	Programmes for Grades 8 and 9 were piloted
24 November 1995	Piloting of environmental education programmes	Grades 11 and 12

Date of researcher participation	Format of participation	Purpose of participation
16 January 1996	Tswaing planning meeting (27 persons present)	Discuss the need for an environmental education centre, an environmental education community awareness programme and naming the trail.
25 January 1996	Walked the trail with 18 teachers from schools in the host community	Familiarise them with the trail environment in which the environmental education activities are planned.
2 February 1996	Teacher workshop at Tswaing	Brainstorming the draft teachers manual and the activities in the context of their own experiences of the planned target audiences, trail environment and environmental education experience
10 February 1996	Tswaing Forum meeting	Obtain the input of the meeting on the edited document
21 February 1996	Planning meeting	Get the meetings input on the edited document
April 1996	Final teachers guide was edited and implemented	

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TABLE 6.3 RESEARCHER PARTICIPATION AT TSWAING: PHASE 2

Date of researcher participation	Format of participation	Purpose of participation
21 October 1997	Planning meeting	To inform the planning committee that UNISA (University of South Africa) and other interested organisations be involved in developing the environmental education programmes in a more structured way for the formal education sector.
24 October 1997	Meeting with the educational committee of Tswaing	The educational committee of Tswaing met to discuss the process.
28 October 1997	Educational committee meeting	Discuss the holistic and multi-disciplinary approach that had to be followed. Identify sixteen activity points (a to p) and educational themes at each point were identified. Programmes were to be developed for all four phases: Gr1 to 3, Gr 4 to 6, Gr 7 to 9 and Gr 10 to 12.
25 November 1997	Tswaing planning committee meeting	Appoint four members from the host community to participate in the education committee's development of the trail. They represented the youth forum, planning committee and the Tswaing Forum.
5 December 1997	Site visit with the activity developers.	Walk the trail and visit the 16 activity sites and group them into ten stations.
9 January 1998	Meeting of the activity developers.	Group the activity developers into teams to develop specific station activities depending on their expertise. Criteria for the development of each programme was stipulated.
19 January 1998	Meeting with two of the senior local residents that has been in the area for many areas.	Obtain indigenous information about Tswaing and surrounding areas to incorporate into the activities.
9 February 1998	Meeting with local teachers	To obtain their inputs and ideas into the programmes
16 February 1998	Editing meeting	Obtain inputs on the revised activities from the whole group of activity developers

Date of researcher participation	Format of participation	Purpose of participation
23 February 1998	Editing meeting	To obtain inputs from the different activity developers and to decide on dates for piloting the activities.
9 to 12 March 1998	Piloting of environmental education programmes	Piloting the activities for each phase of the learner groups.
18 March 1998	Final editing meeting	To do the final editing, work in inputs and review the activities and programme as a whole
End of March 1998	Final report and activity manual handed over for use on the trail.	

TABLE 6.4 RESEARCHER PARTICIPATION AT WINDY BROW

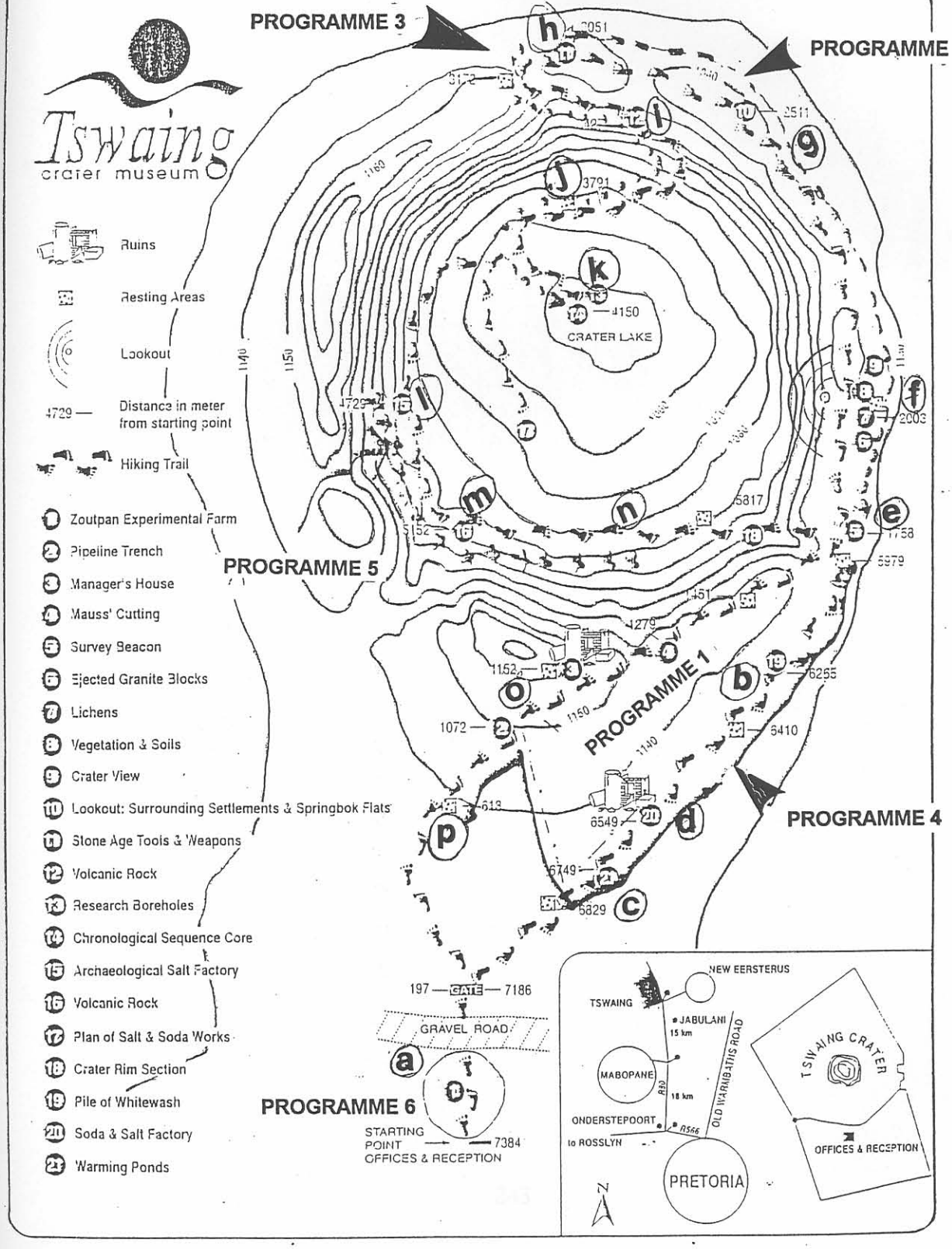
Date of researcher participation	Format of participation	Purpose of participation
31 January 1997	Trail survey	Visit the existing trail network to obtain background information and contextual information about the trail and the environment in which it is situated.
20 and 23 February 1997	Walked the trail network	To write down the type of environmental education information that can be found along the different sections of the trail.
25 February 1997	Discussion with owners	To discuss the different environmental education possibilities of the trail network.
26 February 1997	Meeting with Pretoria Technikon students	To discuss the possibilities of environmental education activities on the trails for which the students had to develop different environmental education programmes.

TABLE 6.5 RESEARCHER PARTICIPATION AT NORTHCLIFF

Date of researcher participation	Format of participation	Purpose of participation
9 September 1998	Trail survey	Visit the existing trail with Ulbe Visser to obtain background information and contextual information about the trail and the environment in which it is situated.
28 September 1998	Meeting with developers from the Rotary Club	To discuss the possibilities the trail has for environmental education.
12 October 1998	Meeting with developers	To discuss the different environmental education possibilities of the trail.

APPENDIX 4: MAP OF TSWAING TRAIL

TSWAING CRATER TRAIL



APPENDIX 5: DRAFT MAP OF RUSTENBURG TRAIL

Map not to scale

APPENDIX 6: MAP OF WINDY BROW TRAIL

WINDY BROW NATURE ASSOCIATION HIKING TRAIL, GAME FARM, ENVIRONMENTAL EDUCATION AND OUTDOOR ADVENTURE CENTRE

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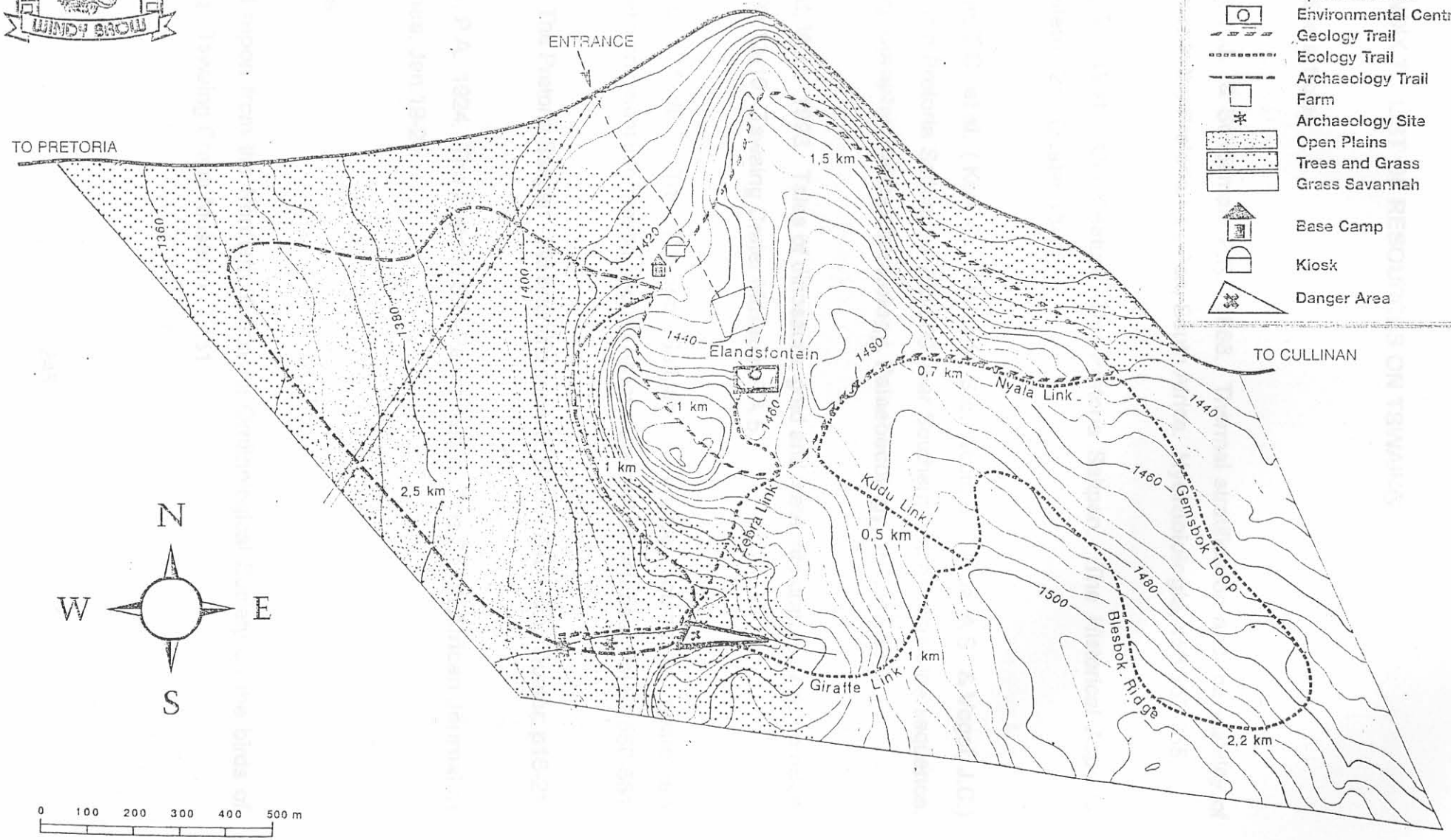

APPENDIX 7: LIST OF RESOURCES ON TSWAING

Magazine articles

Ashton, P.J. & Schoeman, F.R. 1988. Thermal stratification and the stability of meromixis in the Pretoria Salt Pan, South Africa. **Hydrobiologia**, 158:253-265.

Levin, G. 1991. Our Feature: The Pretoria Saltpan. The Historical Aspects. **Geobulletin**, 2nd Quater:13-14.

Partridge, T.C. **et al.** (Kerr, S.J., Metcalfe, S.E., Scott, L., Talma, A.S. & Vogel, J.C.) 1993. The Pretoria Saltpan: a 200 000 year Southern African lacustrine sequence. **Palaeogeography, Palaeoclimatology, Palaeoecology,** 101:317-337.

Reimold, W.U. 1993. Tales of dinosaurs, gold and meteorite craters. **Archimedes**, Mei 1993:13-19. Tswaing Crater Museum, TA 5.

Scott, L. 1988. The Pretoria Saltpan: a unique source of quaternary palaeoenvironmental information. **South African Journal of Science**, Vol 84:560-561.

-.1991. The Pretoria Saltpan - the scientific aspect. **Geobulletin**, 2nd Quater: p16-21.

Wagner, P.A. 1924. The Pretoria Salt-Pan revisited. **The South African Journal of Industries**, Jan:19-21.

Reports

Untitled report from the Northern Transvaal Ornithological Society on the birds of Tswaing. Tswaing Crater Museum. TA51

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Ashton, P.J. & Schoeman, F.R. -. **Water Report.** p14-16. Tswaing Crater Museum TA9.

Bredenkamp, G.J. -. **Grazing Capacity of Tswaing Museum Site.** Tswaing Crater Museum TA50.

Bredenkamp, G.J. 1993. **The Vegetation of the Farm Uitspan.** Tswaing Crater Museum TA 65.

Bredenkamp, G.J. 1994. **Game Species Composition for the Tswaing Museum Site.** Tswaing Crater Museum TA49.

De Jong, R.C. 1995. **A Short History of the Settlements Around Tswaing.** National Cultural History Museum, Pretoria.

De Jong, R.C. 1996. **Chronology of Historical Information on Tswaing.**

Partridge, T. 1993. **Environmental Data Relative to the Establishment of a Museum at the Pretoria Saltpan.** Tswaing Crater Museum TA17.

Reimold, W.U, Koeberl, C. & Brandt, D. 1994. **The Origin of the Pretoria Saltpan Crater.** Council of Geoscience, Pretoria. Tswaing Crater Museum TA36.

Van Rooyen, N. & Schultz.-.**Plant Community Diversity and Species Relationships of an Impact Crater Near Pretoria, South Africa.** Tswaing Crater Museum TA74.

Van Rooyen, N. & Van Wyk, A.E. -. **Prelimenary Plant Species Checklist: Tswaing Crater Museum.** Tswaing Crater Museum TA60.

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Notes

The two boreholes in the crater floor.

The Carbonatite

Ejected Granite Block

The Crater Rim Section

Geology

Reservoir

The Maroela Tree

List of species of medicinal importance collected at the Pretoria Zoutpan.

Birdwatching at Tswaing. Compiled by H.D. Oschadleus.

Trees for everyday use. Tswaing Crater Museum TA56

De Wet, D.F. 1982. **Bewaringsboerdery en Droogte: Soutpan Proefplaas.** Tswaing Crater Museum TA102.

Photos

General view of the Saltpan.

View of the Pan during the dry season, 1916.

Aerial view of the Saltpan.

Method of putting down boreholes in the Pan by hand-jumper. Southern rim with Mauss' Cutting in the background.

Maps

Geology of the Pretoria Saltpan (Zoutpan) Crater. Compiled by Dion Brandt 1992-1993.

APPENDIX 8: MINUTES OF MEETING HELD ON 18 MARCH 1998 AT THE MUSEUM

1. **Present:** Liz, Helene, Marthie, Tumi, Callie, Elrina, Miriam, Irma, Solly, Robert, Alet and Salome.

2. **Apologies:** Mark

3. **Report on the pilot programmes:**

Programme 1: Done with grades 8 and 10 who enjoyed the mornings activities. Encountered problems with language, background knowledge, translation, graphics, experiments. The learner's concept of environment only linked to the natural environment. The teachers shared freely and willingly and responded that it was a learning experience for them too. The cross-curricular approach and local concepts transferred to home were new to them.

Programme 2: The foundation phase programmes worked well. Translation was a problem as well as convincing the parents. Guidelines for clothing for a field trip needed. A need exists to transport the learners to the starting point of the programme otherwise time becomes a problem.

The intermediate group was shy and slowly participated. They enjoyed the activities which was new to them. Terminology in Tswana was also a problem.

Programme 3: With the intermediate phase there was a lack of participation even though the teacher accompanied them. Water is needed along the trail. Proper understanding of language and learner's level was a problem. Rather focus on one activity than to many. Evaluation is difficult.

The foundation phase found it difficult to draw what they can not see. Long distance that had to be walked was a problem. Translation and time was problems. Did not get to k. The learner's enjoyed the activities.

Programme 4: Water, directions, clothing and time, were problems. It was a new environment for the learners. Activities between the points are needed. Freedom to participate is a problem. Follow-up activities are needed. Techniques used in the activities were new to the learners. The school needs to take responsibility for getting the learners to Tswaing on time.

Programme 5: Due to work constraints Louise could not pilot her activities. The meeting decided that these activities will be taken up as is and be adjusted as they are used over time.

Programme 6: Similar problems as the rest of the programmes. Rather take 1 activity and do it till the learners can master it. This programme needs a mature community leader like Chris or Ester to assist with the stories etc.

4. **The way forward:**

* The different activities must be adjusted and finalised by each person although activities remain flexible. Final activities must be send to Callie via E-mail or a hard copy can be send to him to be scanned in. Callie will compile the activity document. All information must reach Callie by 12 April 1998.
* Liz will get an updated map with the sites to include in the document.
* The meeting decided to give the following descriptive names to the 16 sites.

A - Nguni Cattle
B - Marula trees
C - Warming ponds
D - Salt and soda-ash factory
E - Beacon
F - Granite

G - Settlements

H - Stone age

I - Volcanic rock

J - Vegetation zones

K - Saltpan

L - Iron age

M - Volcanic rock

N - Wagon road

O - Manager's house

P - Indaba tree

* The training of the educational officers in May 1998 must still be done names from UNISA and SACTE can be used, criteria must be identified (St 8 to 10, Sotho speaking, etc) as well as the format of the training (workshops etc?). This phase must still be negotiated with the museum.
* The activities for the education centre must still be developed. This phase must still be negotiated with the museum.
* A brochure for adult-trailists must be developed. This phase must be still negotiated with the museum.
* A report of the project must be compiled. Documents for the schools and officers must be compiled.
* Miriam and Alet will circulate the general information brochure for inputs.

5. **General comments from Alet:**

* It was a new experience for the learners.
* Afrikaans and English are the medium of instruction in the museums.
* Heat is a problem
* Was a positive experience for all.
* Educational programmes are never ready immediately
* There is a need for a full-time educational officer to apply and upgrade the programmes over time.
* Follow-up programmes are needed.

* A brochure is needed to tell the teacher and learner what they need and get.
* Strategies need to be build into the programmes to try and overcome problems.
* The expectations of different phases are different.
* Allow for creativity.

6. **Educational officer:** There is a big need for an educational officer at Tswaing. This officer can be a staff member of GDE or NW. Any good programme needs some one to implement it. Callie will formulate a motivation. The following ideas were shared by the meeting on this issue:

* The schools need to get information before the time like lists, rules etc.
* Workshops must be held to introduce the teachers to the new activities that are planned for their learners.
* It will give Tswaing a prestige value.
* The person will have to do and co-ordinate the bookings, planning, follow-up, assessment, workshops, etc.
* The person will have to compile all related documentation.
* The person will have to monitor the programmes, change and upgrade where needed.
* The person will have to compile the activity sets, group the visitors etc.
* The officer will help with the training and upgrading of the educational officers that assist on the trail, book them and co-ordinate their schedules.
* Qualifications that such a person need are: Environmental education background, PR experience, first aid knowledge, language proficiency, writing skills, people skills, etc.

7. **General:**

* A certificate or letter of appreciation can be given to those coming to Tswaing.
* The activity material boxes needs more thought.
* Liz will buy 50 water bottles, and some first-aid kits.
* Walkie talkies should also be introduced.

8. **Next meeting:**

A date was not set. A further meeting will only be held if and when it is necessary.

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APPENDIX 9: EXAMPLE FROM TSWAING TEACHER'S MANUAL - PHASE 1

2.3.5.2 Table of activities

SECTION 4 (30 min walk) This section starts among the trees on the northern side of the pan. The trail continues around the edge of the pan towards the two boreholes. This section ends here.	**Objectives** * To understand the formation of the saltpan * To make use of specific skills and equipment to test the water quality and measure the water temperature * To see the correlation between change in soil type and vegetation * To identify the animals and birds around the pan * Experience the change in micro-climate from the rim to the pan		**Information board** 13. Research boreholes	
Themes	Salt pan	Water	Animals/Birds	Soil
				* How does the soil differ in colour and texture from the soil on the rim of the crater? [PS/HS/G/5] * Take a sample of the soil. Do a pH test back at school.[HS/S/10]
				Vegetation
Activities	* Feel the white deposit on the rim of the pan. What is it? How did it form?[PS/HS/S/2] * Where does the salt in the crater come from? Rain, rock, meteorite[PS/HS/S/G/3] * What does salt get used for?[PS/HS/G/3] * Which industries make use of salt and how?[PS/HS/G/3] * What are the metal structures in the water? What were they used for? [PS/HS/G/3] * What is the temperature like at the salt pan? Compare it with the temperature on the rim of the crater?[PS/HS/G/2]	* Smell and taste the water. How does it compare with the water at home? [PS/HS/G/2] * What is the colour of the water? Why is it this colour?[PS/HS/S/2] * What organisms do you see in the water?[HS/PS/B/2] * Measure the temperature of the water?[PS/HS/B/5] * Do a water quality test.[PS/HS/B/5] * Why do you think they drilled the two boreholes?[HS/G/2] * What can the water in the pan be used for?[HS/G/2]	* Look for animal spoor around the pan. Try and identify them with the aid of the table.[PS/HS/B/5] * Make a plaster cast of one print.[PS/A/10] * Look for bird footprints around the pan. Try and identify them with the aid of the table.[PS/HS/B/5] * Record on the table which and how many birds you see at the water.[PS/HS/B/5]	* What type of vegetation occurs directly around the pan and why?[HS/B/3] * How does the vegetation around the pan compare with the vegetation at the rim of the crater? What causes the difference?[HS/B/3]

APPENDIX 10: LIST OF PEOPLE THAT GAVE INPUTS INTO TSWAING ENVIRONMENTAL EDUCATION ACTIVITIES

Name	Address	Tel/Cel/Fax/Email
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Petro van Niekerk	Vista University, Dept of Biological Sciences, P/b X634, Pretoria 0001	T: 322 1303 F: E:
Anna Hugo	Department of Primary School Teacher Education, Unisa, PO Box 392 Pretoria 0003	T: 4294002 F: 429 3444 E: hugoaj@alpha.unisa.ac.za
Irma Horn	Department of Primary School Teacher Education, Unisa, PO Box 392 Pretoria 0003	T: 429 4381 F: 429 3444 E: hornih@alpha.unisa.ac.za
Marthie Bornman	Department of Educational Studies, Unisa, PO Box 392 Pretoria 0003	T: 429 4004 F: 429 3444 E: bornmgm@alpha.unisa.ac.za
Dietmar Vogl	Tswaing Crater Museum, P.O Box 28088, Sunnyside, 0132	T: (01214) 987302 F: Do E: nchm@nchm.co.za
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Carol Steenkamp	Vista University Dept of Agricultural Sciences P/Bag X634, Pretoria 0001	T: 322 1303 F: 322 3243 E: STKMP-CJ@acaleph.vista.ac.za
Elrina Whitlock	Vista University Dept of Biological Sciences P/Bag X634, Pretoria 0001	T: 322 1303 F: 322 3243 E: WTLCK-CE@acaleph.vista.ac.za

Zola Vakaliza	Department of Secondary School Teacher Education, Unisa, PO Box 392 Pretoria 0003	T: 429 4788 F: 429 3444 E: vakalncg@alpha.unisa.ac.za
Mark van Heerden	SACTE, Private Bag x460, Pretoria 0001	T: 422 8213 F: 343 9893 E:mfdvanheerden@sacte.ac.za
Romy Little	110 Van Heerden Street Capital Park, Pretoria 0084	T: 01214 912165 F: 01214 912167 E:
Annah Kekana and Venda Bopape	Transvaal Museum, P.O Box 413 Pretoria, 0001	T: 012-3227632 F:012-322-7939 E:kekana@tm.up.ac.za
Louise Maritz	Gauteng Nature Conservation Community Services Private Bag x209, Pretoria, 0001	T:012-3032824 F:012-3032046 E:
H G van Rooyen	Dept Kurrikulumstudies, RAU, Bus 524, Aucklandpark, 2006	T:011-4892666 C:0828086402 F:011-4892048 E:hgvr@edcur.rau.ac.za
Valerie Baron	University of Guelph, Canada	T:519-8371066 905-2721822 F:905-2721955 E:vbaron@uoguelph.ca
Riana Venter	Posbus 202, Settlers, 0430	T:014-7300039(h) 01464-43601/2(w) C:0825774869 E:rianven@netactive.co.za
Tumi Holomisa	SACTE, Private Bag x460, Pretoria 0001	T:012-4228154 F:012-3439893 E:tholomisa@sacte.ac.za
Meriam Maswanganye	Tswaing Crater	T:012-7902302 C:082 6547084 E:
Joas Mapanyane	Tswaing Crater Educational Officer	T:01214-987302 F: E

Clansinah Khunou	Tswaing Crater	T:01214-987302 F: E
Sydney Matjeni	Tswaing Crater Youth Committee	T:01214-3687 F: E

Esther Masilela Community member

Diketedi Modise
Thulaganyo Middle School
P O Box 131
Winterveldt
0198

01214-7040447

Leta Mahwanazi (Tswaing Planning Committee)

Ester Moketsi (Chair person Tswaing Forum)

Solly Kotu (Soshanguve school, 01214-7931002)

Salome Mafa (Batiseng Primary School, Soshanguve, 01214-7931337)

Robert Molapo (Junior Secondary School, P.O Box 2753, Rosslyn, 0200, 012-5493060)

Alet Boshoff (National Cultural History Museum, 341 1320)

Robert de Jong (National Cultural History Museum)

Kobus Basson (National Cultural History Museum)

APPENDIX 11: EXAMPLE FROM RUSTENBURG TRAIL BROCHURE

6.4 Trail description

Ice-breaking session on arrival:

When you arrive at the Kudu hut, inspect the area around the hut and concentrate on the following:

* *Would you say the hut is situated on a ridge, in a valley or gulley? Why do you say this?*
* *Take a hand full of soil and feel what it is like, is it fine or coarse?*
* *Do you hear or see any birds and animals around the hut? Can you identify them?*
* *What is the vegetation like around the hut? Are there lots of grass, shrubs or trees?*
* *Desribe the feature in front of the hut. What do you think caused this? How can it be stabilised?*
* *What do you notice about the rocks to the right of the kloof above the hut?*

After allowing the individuals to investigate and experience the area an officer from the reserve can welcome them to the reserve later the evening. The officer can give a very brief information session on the aspects covered by the above ice-breaking questions.

DAY ONE: Suggested departure time - 07:00

Activity a:

* *Ask the individuals to write down a description of the types of vegetation they walk through and what animals they see in each area.*

Activity b:

* *Also give them a contour map of the trail and ask them to fill in any streams or possible streams they come across. Indicate the presumed direction of flow.*

When you have climbed the ridge you arrive at the crest.

Activity c:

* *Pick up some soil and feel it, how does it compare to that at the hut?*
* *Describe the vegetation and rock formations you see when you have reach the crest.*
* *What is the air temperature like here?*

The soil here is shallow and gravelly with limited plant cover because soil of this kind retains very little moisture. This lack of water and food limits the animal life here.

The route continues down towards the tar road. After crossing the road the route descends downward along the crest towards the valley below.

Activity d:

* *How deep is the soil here?*
* *How much water do you think the plants need?*
* *Compare the soil, vegetation, rock formations and air temperature here with that of the kloof.*

The trail climbs along the crest you will come across some "Boer War skanse".

Activity e:

* Draw the lay out of these trenches.
* Why do you think they are located here?
* What do you think their purpose was?

7.2 Baviaanskrans worksheet

Ice-breaking session on arrival

Would you say the hut is situated on a ridge, in a valley or gulley? Why do you say this?
. . . . . .
. . . . . .
Take a hand full of soil and feel what it is like, is it fine or coarse? . . . . . .
. . . . . .
. . . . . .
Do you hear or see any birds and animals around the hut? Can you identify them? .
. . . . . .
What is the vegetation like around the hut? Are there lots of grass, shrubs or trees?
. . . . . .
. . . . . .
Desribe the feature in front of the hut. What do you think caused this? How can it be stabilised? . . . . . .
. . . . . .
. . . . . .
What do you notice about the rocks to the right of the kloof above the hut?
. . . . . .
. . . . . .

DAY ONE:

Activity a:

Ask the individuals to write down a description of the types of vegetation they walk through and what animals they see in each area. . . . . . .
. . . . . .
. . . . . .
. . . . . .

Activity b:

Also give them a contour map of the trail and ask them to fill in any streams or possible streams they come across. Indicate the presumed direction of flow.

Activity c:

What do you note about the rocks, vegetation and temperature in the kloof?

. . . . . .
. . . . . .
. . . . . .

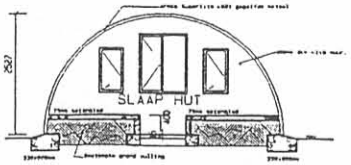
Complete the following table over the next two days.

PLACE	*TIME*	*TEMPERATURE*	*VEGETATION*	*ALTITUDE DESCRIPTION*
Kudu hut				
Kloof				
Crest				
Plain				
Eco-hut				
Waterfall				
Tar road				

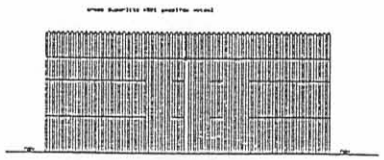
What is the soil like in the kloof? . . . . . .
. . . . . .

APPENDIX 12: ECO-HUT AT RUSTENBURG

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA



SNIT A-A 1:50



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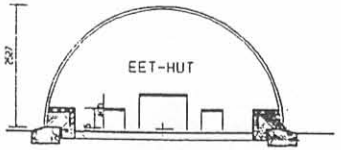
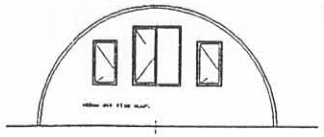
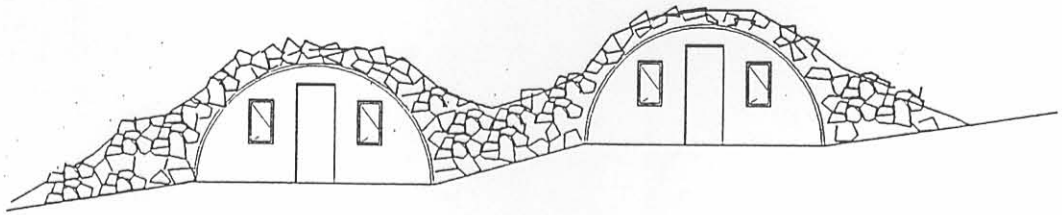


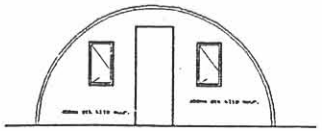
SNIT B-B 1:50



AANSIG 3. 1:50



AANSIG 1. 1:50



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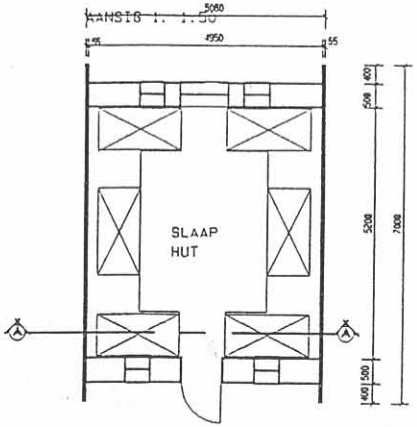
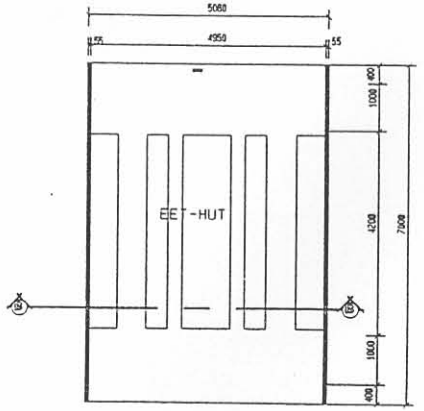


PLAN 1:50



PLAN 1:50

WYSIGINGS REVISIONS

TRANSVAALSE PROVINSIALE ADMINISTRASIE
TRANSVAAL PROVINCIAL ADMINISTRATION

HOOFDIREKTORAAT : WERKE
CHIEF DIRECTORATE : WORKS

R.L.S. UYS

RUSTENBURG NATUUR-RESEVAAT

STUPPERS HUTTE
TIPE A.

W4/2/1/87

EBEN EMELIN

S. I. MOLALA

1:50

DEC. 1993

K. FISCHER.

DEPARTEMETEEL

12115/02

APPENDIX 13: EXAMPLES OF TSWAING ENVIRONMENTAL EDUCATION ACTIVITIES - PHASE 2

Activity 13

Stations : Station F

Topic: Making soil

Learning area: Human and Social Sciences, Natural sciences, Technology

Outcomes:

- To indicate how weathering leads to soil formation
- To show different types of soils and soils in different stages of weathering
- To teach learners some calculating skills

Skills: To read time, measuring by using a teaspoon

Duration of activity: 40 minutes

Materials needed: Two pieces of soft stone, a newspaper, a spoon or small measuring instrument, a self made clock, bottles with pebbles, different soil types.

Pre visit activity: Let the children make a clock by using a paper plate or by cutting out a round piece of card board. Insert clock arms by cutting them out and fastening them with a paper clip.

Background

It is important that young children understand how important **natural resources** are. Soil is one such a resource which supplies plants a place to grow, contain minerals, etc. It, however takes a long time to be formed. This activity will show how soil is formed and how long it takes to be formed. It will also be shown what happened at the crater and where the rock pebbles come from. It will be shown how different soil types look like. This activity can be extended in the class room by growing seedlings.

Methodology:

1. Let children rub rocks together for exactly 10 minutes. The rocks must be rubbed vigorously. Collect the dust on a piece of newspaper.
2. After 10 minutes measure the sand made with a tea spoon or other measuring instrument.
   The amount of sand made in 10 minutes was: _____ level teaspoons.
3. A few calculations can be made according to the level of the learners. Ask the learners: if it took 10 minutes to make the amount of sand mentioned in 2 above, how long will it take to make 100 cubic

centimetres (100 teaspoons).

4. For a bit older children, A medium sized tree needs at least one cubic metre of soil in which to grow. A cubic metre contains 1 000 000 cubic centimetres or 1 000 000 level teaspoons. How long will it take to make enough soil for a tree? Show your calculations.
5. In what ways can soiled be formed? Bearing in mind that rocks are not rubbed together in nature as continuously as in our activity - would you say that soil is formed quickly, slowly or very slowly.
6. Tell us why you think soil is an important resource for us.

Post visit activity

1. When back in the class room, learners can use old plastic margarine containers and make holes in the bottom of the containers. Add some small stones and fill them with some of the soil that was made in the activity. Also make a container with some other soil (Other interesting containers can be used such as egg shells, hollowed out potatoes, etc.)
2. The learners plant a seedling in each container, press soil around it and water. (Seeds can also be used)
3. Learners label the containers with their names and the type of plant they are growing.
4. Learners make up a note book on their plants or on a piece of paper left beside the container. Learners note the dailey growths of their seedlings, measuring changes in height, new leaves, flowers, etc.
5. After a while the plants can be presented to family members, the Tswaing crater, the local library, a park, the school, etc.

Why do the seedlings not grow well in the freshly made soil?

Adapted from `We care primary'

Example of table to use for observation

Date	Growth observation
Monday 11 March	*Seedling grows 1cm, 1 new leave formed*
Tuesday 12 March	*Seedling grows 0,7 cm, No new leaves*
Thursday 14 March	*Seedling grows 1,4 cm. Two new leaves formed*
Etc	Etc

The table can only be used by children that can read and write.

APPENDIX 14: DISCUSSIONS WITH TWO OF THE COMMUNITY MEMBERS OF TSWAING

Discussion with Ester from Kromkuil at Tswaing on 19/01/1998

* Pedi's, Sotho's and Tswana men lived at the mine in compounds while the families lived at Kromkruil. The cattle was also kept at Kromkuil.
* The people worked at the mine in day and night shifts to get money to send the children to school. It was only at a later stage that believe aroused that the spirits were not allowed to be disturbed at night.
* The mine provided an opportunity to make a living.
* Young girls helped to pack the sacks.
* Pyramid was the closest station to the factory and the salt was carted by oxwagen (Nguni) and bokwagen.
* Traditional way of mining stopped when the factory started.
* The salt was payment for the packers/helpers. They sold it again in solid pieces. The salt was packed in hesiene bags.
* Mr du Toit was the plant master
* Church and school gone
* There is a storey that the meteorite came after the factory.
* Lebalangwe: stayed there, local mine, clay soil, made dishes from the clay soil.
* The lime bags are the last stop before the salt was packed. Hard canvas was placed on top of the bags. The lime was used to disinfect the salt and keep it dry and loose/fresh. Ox wagens were used to transport the salt.
* The morula fruit was boiled and used for beer. This was sold again.
* Morokulu tree is scarce in the veld now. They used it for jam and did not need sugar to sweeten it. Was like youngberries.
* At the factory the salt was dried in the drying pans.

Discussion with Mr Tiki Motau (born in 1918) at Tswaing on 19/01/1998

* The soda was boiled at night and was dangerous
* The factory closed in 1961
* The workers got paid 6 sjielings a month
* The first group of salt miners were unsuccessful
* Lime was added into the soda to get it white but it stayed brown.
* A diesel machine was used to mix it for 1 hour.
* The Middleburg farmers bought a lot of salt for their cattle and goats
* The coal used came from ABC coal company in Pretoria West. The coal was used twice therefore the ash is very fine. If the ash heaps are dug up some articles used in the factory might be found.