



National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

2009

Internal Assessment Resource

Subject Reference: **Geography 1.6**

Internal assessment resource reference number:
Geo/1/6_B7

Erosion and Coastal Management at Ngāpipi Beach

Supports internal assessment for:

Achievement Standard: 90207 v3

Describe a contemporary geographic issue and evaluate courses of action

Credits: 3

Date version published:

March 2009

**Ministry of Education
quality assurance status**

For use in internal assessment
from 2009

Teacher Guidelines:

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Context/setting:

Students are asked to examine a local environmental geographic issue. This assessment is based on actual location and issue about coastal management and erosion.

Conditions:

The activity is designed for completion individually, in class.

It is suggested that students be given two separate one-hour periods to complete this assignment. The intention of the achievement standard is that students should have time to use resources supplied over a longer time frame than is available in an external assessment.

Resource requirements:

All required resources are supplied.

Additional information:

This resource is based on an actual location and situation with some fictitious data added and names changed. It could easily be adapted to reflect the school's actual location with the substitution of place names.

This activity presupposes the prior teaching of the causes and effects of coastal erosion and common methods of solving the problem (e.g. engineering solutions such as groynes, biological solutions such as the planting of sand stabilising grasses). The skill of evaluating courses of action and fully justifying a recommendation will need to have been pre-taught.

Schools and departments should have authenticity procedures in place with respect to student work, as homework is included.

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Supports internal assessment for:

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Describe a contemporary geographic issue and evaluate courses of action

Credits: 3

Student Instructions Sheet

You must complete all three tasks. Use the spaces provided in the worksheets. If you use any extra sheets of paper, make sure you mark them clearly with your name and attach them securely to the worksheets.

OVERVIEW

For this contemporary geographic issue you will:

Read the article on “Coastal Management and Erosion at Ngāpipi Beach” in order to:

1. Describe the issue of Coastal Management and Erosion at Ngāpipi Beach
2. Describe the viewpoints of people toward the issue
3. Evaluate courses of action and recommend which one should be pursued

INSTRUCTIONS

This is an individual assessment activity.

Two separate one-hour periods will be given for the assessment.

Read resource A below:

Resource A – a newspaper article:

This resource is based on an actual location and situation with some fictitious data added and names changed.

Erosion and Coastal Management at Ngāpipi Beach

The beachfront community of Ngāpipi Beach has been studying the coastal erosion occurring in the area and debating how to solve this problem. Sand loss at Ngāpipi Beach is threatening many of the homes and batches near to the beach. Erosion has always occurred at Ngāpipi Beach but this was not a concern until twenty years ago when large-scale housing development began there and new roading, by providing better access, increased the use of the beach for recreation.

The concerns of the local residents resulted in the regional council employing **Dr Sila Moore** from the **National Institute of Water and Atmospheric Research (NIWA)** to prepare a report about the erosion and how to prevent it. Her report showed alarm at the rate of erosion and the impact this was having on the beach and coastline. In places, the report said that sand loss had made the beach a bare rock beach rather than a sandy beach. Some coastal plant communities had also disappeared because of the erosion. Dr Moore also expressed concern at the impact the erosion would have on beachfront properties in the near future. The erosion she said, had created low cliffs in the sand at the back of the beach and this was moving closer to houses along the beach front. She pointed out that since the council issued building permits for houses to be built along the coastline, the council had legal responsibilities to the property owners.

Dr Moore said that the uncoordinated building of many small-scale erosion prevention measures, by residents, would be ineffective. She pointed out that the ability of the waves to erode the beach during a storm is greater than the ability of the small-scale structures to prevent it. She added that boulders, small sea walls and rock cages would result in a sand loss in the future because, in time, waves will erode sand from underneath these structures. In places around New Zealand where measures like these had been tried they had failed, and also made the beach look unnatural. **Dr Moore** proposed the development of an experimental dune project along the foreshore of Ngāpipi Beach to prevent long-term erosion of the beach. The project would include making an artificially constructed sand dune. The slope of the dune would be designed to absorb the effects of the waves and protect the land behind from further erosion. The dune would be planted in pingao and spinifex to stabilise it and prevent it being washed away. The area would be fenced off so people could not trample the dune. Detailed research has been done into the effectiveness of this project. It would be on a large scale, expensive but offer the best long term solution. The dune would extend along the whole length of the beach in the area suffering from erosion..

Jason Beatty, who lives in Foreshore Drive, is very worried about the sand erosion. His garden is now only 10 metres from the high tide mark. Each storm that coincides with a high tide sees more of the coast removed. When he first moved in, twenty years ago, his fence was 40 metres from the high tide mark. He is worried about his garden

and house being threatened by the sea if the erosion continues. Jason said that last year the council had to close 50 metres of Foreshore Drive being undercut by erosion, and reroute that part of the road further inland. Jason has criticised the dune proposal that he says would take several years to complete, may or may not work and involve great expense. He says that if it does work the beach and foreshore would be drastically altered. He said if the dune became very high he would lose his view of the sea and he paid a lot of money to get such a view. If the experiment doesn't work, he said, properties could be lost. Jason argues that the experimental dune project is too drastic in the way it will alter the beach environment. He would like to see groynes built at regular intervals along the beach. Constructing a series of groynes along the beach could be completed quickly and would involve a moderate cost compared to the dune experiment. He said that groynes would trap sand on the beach and with more sand on the beach, waves would not reach the back of the beach and so property would be protected. Access to the beach from Foreshore Drive would not be hindered by the use of groynes as it would with the experimental dune project. Groynes he says, have worked well in some Australian and European beach areas he knows about.

The Ngāpipi Beach Residents' Association is concerned about erosion along the coastline but feels it is not as big a problem as Dr Moore says. They oppose both the building of groynes and the dune project. The association feels the erosion is relatively slow, occurs only during large storms and affects some parts of the beach more than others. Storms last year damaged pipes carrying stormwater onto the beach and also destroyed two sets of steps used by the public to get onto the beach. They say that small, low-cost measures will easily stop what erosion is occurring, and point out that at similar beaches around New Zealand groynes have not always been totally effective in preventing erosion. They also feel that the large number of groynes needed would create an eyesore. Instead the association favours each homeowner taking responsibility for protecting the section of beach opposite their home. The sorts of methods local residents could use include placing large boulders, hard fill or small sea walls along the beach above the high tide mark. The association argues that its proposal is less disruptive to the environment than large scale projects. They say homeowners would take the action that would best tackle the problem in the area where they lived, and would not be too costly for homeowners because of the subsidies available from the regional council.

The local surf club is not that worried about the erosion itself. They say that it does not affect beach use or safety. They comment that sand eroded from the beach has formed bars offshore and these offshore bars improve conditions for surfing. They are worried about the possibility of the groyne development. They are concerned that groynes would reduce access along the beach and they will not be able to get to all sections of the beach easily and quickly in the event of an emergency. The club recognise something must be done to protect beach front properties and would like to see rock cages placed along the beach between the high tide mark and the Foreshore Drive properties. They want the council to do this in an organised and coordinated way. The surf club points out that the method of using wire cages filled with rock is not overly expensive and would not be a big cost to be met by ratepayers. Access to, and along, the beach would not be affected. This would be a win-win solution for the property owners, council and beach users.

Blair Rāwiri is not concerned about the erosion. He firmly believes that we should learn to live with it. He said that just because the council allowed housing to be built along the coast doesn't mean we have to set out to try to prevent the natural process of sand erosion. He says that along this part of the coast there is a history of erosion that is then followed by several years of deposition when the sand builds up again. He opposes all of the proposals to prevent erosion and prefers a "do nothing" approach. Blair believes that the tangata whenua of the region are the *mana whenua* and, as such, have the right to manage and control the land as they see fit. However, their numbers are low and their views have not been taken seriously on local issues in the past. He would prefer that "nature be left to run its course and people not interfere with the natural processes operating at the beach". He argues that this would be more culturally sensitive than the other proposals and that none of the proposals will change the course of nature and will be a waste of time and money. Blair Rāwiri argues that the NIWA dune proposal is far too expensive.

The Regional Council is unsure how to proceed with this issue and is seeking opinions from a wide section of the community. If you wish to make your opinion known, you can go to the regional council's website to register your opinion. The website is: www.Ngäpipiregionalcouncil.govt.nz/coastalmanagment/responses

Task 1: Examine the geographic nature of a contemporary issue

The geographic nature of an issue relates to its effects on people and on the environment.

This case study is about the issue of coastal erosion and ways it could be tackled at Ngāpipi Beach.

Describe how coastal erosion at Ngāpipi has effects on the environment and on people. Include specific evidence (examples, information and facts) from the resource material provided to support your answer.

Effects that coastal erosion at Ngāpipi has on the environment:

Effects that coastal erosion at Ngāpipi has on people:

Task 2: Describe viewpoints that relate to the issue

On the 'viewpoints chart', write your responses to the following questions.

- a) Choose FOUR individuals or groups involved. Name them in the chart below.
- b) Complete the chart below by stating and describing in detail what each individual or group thinks is the best way of dealing with erosion at Ngāpipi.
- c) Individuals and groups have different views about the best way of dealing with erosion at Ngāpipi.

Give reasons why individuals and groups hold the views they do about the best way of dealing with the Ngāpipi erosion. Include supporting evidence from the resource materials in your answer. Reference to geographic ideas may help you answer eg. culture and perception, change and processes

b : Viewpoints Chart

| Name of Individual or Group | Best way of dealing with erosion at Ngāpipi |
|------------------------------------|--|
| 1 : | |
| 2 : | |
| 3 : | |

| Name of Individual or Group | Best way of dealing with erosion at Ngāpipi |
|-----------------------------|---|
| 4. | |

- d) Give reasons why individuals and groups hold the views they do about the best way of dealing with the Ngāpipi erosion. Include supporting evidence from the resource materials in your answer. Reference to geographic ideas may help you answer eg. culture and perception, change and processes

+ _____

Task 3 Evaluate courses of action

Imagine you are a member of the regional council. You have been presented with this information about erosion at Ngāpipi. You have to decide how the erosion at Ngāpipi should be dealt with. Write your answers in the space below.

- a) Choose 3 possible courses of action from the list below of dealing with the erosion at Ngāpipi.

3 possible courses of action:

Circle your 3 responses:

- ♣ Sand dune development
- ♣ Groynes – build walls out into the sea
- ♣ Do nothing
- ♣ Locals – each taking their own small scale action
- ♣ Rock cages – council project

- b) For each of the courses of action you choose, give TWO strengths and TWO weaknesses. Add details to the comments that you make to help explain your answers.

Strengths and weaknesses:

Choice 1: _____ (course of action)

Strengths:

(i) _____

(ii) _____

Weaknesses

(i) _____

(ii) _____

Choice 2: _____ (course of action)

Strengths:

(i) _____

(ii) _____

Weaknesses

(i) _____

(ii) _____

Choice 3: _____ (course of action)

Strengths:

(i) _____

(ii) _____

Weaknesses

(i) _____

(ii) _____

c) Name which course of action you consider the best.

Selected course of action: _____

d) State why the course of action selected above is the best and why this course of action is better than the other two. Refer to all three possible courses of action in your answer. Include supporting evidence from the Ngāpipi resource materials to support your answer.

Assessment schedule: Geo/1/6_B7 - Erosion and Coastal Management at Ngāpipi Beach

| Task | Evidence | Judgements for Achievement | Judgement towards achievement with merit | Judgement towards achievement with excellence |
|------|---|--|--|---|
| 1 | <p>Effects on the environment :Beach has changed from sandy to bare rock; Low cliffs have formed at the back of the beach; Loss of coastal plant communities; Sand bars formed offshore.</p> <p>Effects on people : Property under threat – homes and gardens; Stormwater pipe damaged; Beach access steps eroded away.</p> | <p>Describes two aspects - one about the effect on the environment and one about the effect on people. Distinguishing an environment effect from a people effect is essential.</p> <p>E.g. Environment effect ; <i>The erosion of the sand has changed the beach from a sandy one to one with bare rock.</i></p> <p>People effect : <i>The erosion forced the council to reroute Foreshore Drive further inland.</i></p> | (Achievement only) | (Achievement only) |

| | | | | |
|----------|--|---|--|---|
| <p>2</p> | <p>Name FOUR individuals or groups and describe what they think is the best way of dealing with Ngāpipi erosion</p> <ul style="list-style-type: none"> • <i>Dr Sila Moore</i> Develop a dune along the beach front. This would absorb wave energy and protect land and property behind the dune. It would be the best long term solution. Says other 'ways of stopping the erosion' would not be successful. • <i>Jason Beatty</i> Favours the building of beach groynes as the best option. He has concerns about the dune idea – both if it does work and if it does not work he feels he will be negatively affected • <i>Residents' Association</i> Believe homeowners themselves are the ones best placed to tackle the problem. Favour residents using individual small scale measures like putting large boulders, hard fill or small sea walls in front of their properties. • <i>Surf Club</i> Favour rock cages being placed along the beach above the high tide level. Don't themselves see the problem as a big one, and also see some benefits of sand from the beach forming offshore bars and making conditions for surfing better. Rock cages would solve the problem in the least disruptive way. | <p>Viewpoints of four individuals or groups are stated and described.</p> <p>Task 2b Viewpoints chart :</p> <p>Examples of Achieved standard answers :</p> <p><i>E.g. • Dr Moore favours the sand dune proposal. She says building up a dune would be the best way long term way of stopping erosion at the back of the beach.</i></p> <ul style="list-style-type: none"> • <i>Jason Beatty is worried about erosion of the property he owns. He wants groynes built. He says these would help sand build up on the beach and this would protect properties from the waves.</i> • <i>The Surf Club do not see the erosion as a big issue for them. They favour placing rock cages in front of the properties. This would be a cheap solution.</i> | <p>Viewpoints of four individuals or groups are stated and three are described in detail.</p> <p>Task 2b Viewpoints chart :</p> <p>Examples of Merit standard answers :</p> <p><i>E.g. • Dr Moore favours the dune proposal. She wants to see a dune created all along the length of the beach To keep the dune stable it would be planted and fenced off from the public. A dune she says would absorb wave energy and would be the best way of stopping the erosion over the long term.</i></p> <ul style="list-style-type: none"> • <i>Jason Beatty is worried about erosion of the property he owns and wants a solution that would protect beach front properties. He wants groynes built. He says these would help sand build up on the beach and this would protect properties from the waves. They would also be solution that could be completed quickly and not have disadvantages of a dune.</i> <p>Merit can also be gained with an Achieved standard answer to Task 2b (viewpoints chart) + an Excellence answer to Task 3 (why individuals and groups hold the views they do)</p> | <p>Merit has been gained in Task 2b plus Task 3 is completed successfully:</p> <p>Task 3 answer shows understanding of why individuals and groups hold the views they do. Two main ideas are relevant: i. individuals and groups see the erosion from their own viewpoint; ii. individuals and groups have different degrees of knowledge and expertise about erosion and about this coastal area..</p> <p><i>Eg. Blair Rawiri favours doing nothing and letting nature run its course because for Maori like himself this is the most culturally sensitive approach. He also says that local Maori know the history of this coast and that nature will over time build up the beach again.</i></p> <p><i>Dr. Sila Moore is a scientist with a lot of knowledge about coastal erosion. She understands the way coastal processes work and thinks a dune is the best way of preventing waves from continuing to erode the beach front land. The dune she says will absorb wave energy better than any small scale individual projects.</i></p> |
|----------|--|---|--|---|

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|--|---|--|--|--|
| | <ul style="list-style-type: none">• <i>Blair Rāwiri</i> Let nature take its course. Does not see the erosion as a problem. Believes living with nature is a better approach than interfering with nature. | | | |
|--|---|--|--|--|

| | | | | |
|---------------------|--|---|---|---|
| <p>3a and b</p> | <p>Dealing with erosion at Ngāpipi :</p> <p>Courses of action / strengths / weaknesses stated, e.g.</p> <p>Experimental dune project</p> <p>S = Prevents erosion Long term impact Research based</p> <p>W = Restricts dune access Expensive Is experimental</p> <p>Rock cages</p> <p>S = Low cost Access to beach not hindered Council coordinated</p> <p>W = Waves can erode underneath cages Sand is lost over time</p> <p>Groynes</p> <p>S = Effective in building up sand. Can be quickly developed Moderate cost.</p> <p>W = Access along beach hindered An eyesore</p> <p>Do nothing</p> <p>S = Course of nature not disrupted Long term nature will solve problem Culturally sensitive No cost</p> <p>W = Erosion continues Endangers homes</p> <p>Locals – own action</p> <p>S = Council subsidised People have an incentive to match solution to their own situation and needs Access to beach unlikely to be hindered</p> <p>W = Possibly ineffective Wide variety of methods</p> <p>© Crown 2009 Lack of co-ordination Eyesore</p> | <p>Evaluates two strengths and two weaknesses for 2 courses of action.</p> <p><i>E.g.</i></p> <ul style="list-style-type: none"> • The dune project would prevent erosion. It is also research based and more likely to succeed. <i>The weaknesses are that it would restrict dune access and is expensive.</i> • Constructing groynes builds up sand on the beach. It is less expensive than the dune project. <i>The weaknesses are that beach access would be hindered and they are an eyesore.</i> • Locals taking their own action is subsidised by the Council. Access is unlikely to be hindered. <i>The weaknesses are that there could be a variety of methods used.</i> | <p>Evaluates two strengths and two weaknesses for 2 courses of action.</p> <p><i>E.g.</i></p> <ul style="list-style-type: none"> • The dune project would prevent erosion. It is also research based and more likely to succeed. <i>The weaknesses are that it would restrict dune access and is expensive.</i> • Constructing groynes builds up sand on the beach. It is less expensive than the dune project. <i>The weaknesses are that beach access would be hindered and they are an eyesore.</i> • Locals taking their own action is subsidised by the Council. Access is unlikely to be hindered. <i>The weaknesses are that there could be a variety of methods used.</i> | <p>Evaluates comprehensively two strengths and two weaknesses of 3 courses of action.</p> <p><i>E.g.</i></p> <ul style="list-style-type: none"> • The experimental dune project would prevent erosion and have a long-term impact positive impact on the beach. It is also research based and therefore much more likely to succeed. <i>The weaknesses of the project are that it would restrict dune access. It is also expensive and although research based it is still only experimental.</i> • Constructing groynes is an effective way of building up sand on the beach. The costs are moderate and much less expensive than the dune project. <i>The weaknesses are that with groynes access along the beach would be hindered. The groynes are also an eyesore for everyone because they are so visible.</i> • Locals taking their own action have the advantage of being Council subsidised and also access to beach is unlikely to be hindered. <i>The weaknesses are however that such measures could possibly be ineffective. Also there could end up being a wide variety of methods used because of the lack of coordination.</i> |
|---------------------|--|---|---|---|

| | | | | |
|-----------------|--|--------------------------------------|---|--|
| <p>3c and d</p> | <p>Selects the best course of action fully justifies the recommendation, e.g. <i>Experimental dune project</i></p> <ul style="list-style-type: none"> • Only proposal preventing erosion to beach, long term • Planting of pīngao and spinifex will protect dunes • Planting will enhance the beach environment • Research has been conducted and proves dune's potential • High level of potential effectiveness said to outweigh high costs and cultural issues <ul style="list-style-type: none"> • Local initiatives and rock cages have serious faults in prevention effectiveness • Uncoordinated local measures would be ineffective • Uncoordinated local measures could look very tatty if all different • Rock cages would be eroded underneath • Groynes would prevent erosion but be an eyesore • Groynes would restrict access along beach • Doing nothing means erosion will continue | <p>Selects one course of action.</p> | <p>Selects one course of action and justifies the recommendation by providing an argument for it.</p> <p><i>E.g.</i> <i>The experimental dune project is the only proposal that will prevent erosion, long term. The plantings protect the dunes and enhance the look of the beach. Research shows that the dune's potential will outweigh its high costs and the cultural issue.</i></p> <p><i>Local initiatives and rock cages are ineffective. Uncoordinated local measures would look very tatty if they were all different. Rock cages erode from underneath. Groynes prevent erosion but create an eyesore and restrict beach access. Doing nothing means the erosion would continue that is why the dune project is the best option.</i></p> | <p>Selects one course of action and fully justifies the recommendation by providing reasons as to why it is not only the best but better than the others.</p> <p><i>E.g.</i> <i>The experimental dune project is the only proposal that will prevent erosion to the beach, long term. The planting of pīngao and spinifex will protect the dunes and the planting will also enhance the look of the beach environment. The research that has been conducted proves the dune's potential. The high level of potential of the experimental dune project's effectiveness is said to far outweigh its high costs and the cultural issue of disturbing the dunes. It is the only option that has been researched for the beach.</i></p> <p><i>Local initiatives and rock cages have serious faults which mean that their ability to prevent erosion is ineffective. Any uncoordinated local measures would also be ineffective. Uncoordinated local measures could look very tatty if different people chose to take different measures for their own properties. The disadvantage with rock cages is that they could be eroded from underneath. Groynes would prevent erosion but they also create an eyesore. Groynes would restrict access along the beachfront and this becomes a safety issue in emergencies for the Surf Club. Doing nothing would be culturally sensitive but would mean that the erosion would continue. The effectiveness of the dune project outweighs the costs and experimental aspect.</i></p> |
|-----------------|--|--------------------------------------|---|--|

Judgement Record Summary:

| Achievement Criteria | Achieved | Merit | Excellence |
|--|--------------------------|--------------------------|--------------------------|
| Geographic nature of a contemporary issue | <input type="checkbox"/> | | |
| Viewpoints relating to an issue | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Evaluate courses of action, fully justify recommendation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

The award of a grade should be based on professional judgement against the assessment criteria in the achievement standard using the assessment schedule for detailed guidance. This 'tick box' summary is a form of collation, assisting the assessor in determining the award of a grade.

- Tick the boxes that indicate the grade level that the student responses have provided evidence toward.
- Overall judgement, using the 'tick boxes' for allocating a grade, Achieved/Merit/Excellence
 - For achieved, 3 'achieved' boxes must be ticked.
 - For merit, meets the requirements for achieved plus both merit boxes ticked.
 - For excellence, meets the requirements for merit plus both excellence boxes ticked.

| | | | |
|---------------|--------------------------|--------------------------|--------------------------|
| GRADE AWARDED | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---------------|--------------------------|--------------------------|--------------------------|