Teaching Climate Change in a South African context of high climate variability

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Climate Change Education

• The CAPS
• The importance of Systems thinking
• Teaching in a context of high climate variability
• An open framework for learning-to-change
TEACHING CLIMATE CHANGE: A CAPS curriculum topic

FET- Climate Change (G-G10-12)
Senior- Climate Change (NS-G7-9)
IP - Foundations of weather and climate
FET Climate Change Module

Teaching Climate Change

Geography Grades: 10-12
Coletta Vogel, Sharu, Maser & Priya Vallabh

Learn about...
energy exchange, energy resource use, and responses to energy exchange and climate change.

Using the Fundisa for Change teacher education materials, the programme supports Grade 10-12 teachers to understand and translate the key concepts of climate change for their learners. Teachers also learn to use new teaching methods such as scenario planning and learning by doing, and how to assess climate change learning in Geography.

For more information visit:
fundisaforchange.co.za

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Senior Phase Climate Change Module

Teaching Climate Change
Natural Sciences Grades 7–9
Susan Brundell

Learn about...
the evolving planet, earth systems and climate change, energy and carbon dioxide.

Using the Fundisa for Change teacher education materials, the programme supports Grade 7-9 teachers to understand and translate the key concepts associated with earth systems and climate change for their learners. Teachers also learn to use new teaching methods such as modeling and investigation, and how to assess aspects of Natural Science learning.

For more information visit fundisaforchange.co.za
CAPS Knowledge, Teaching and Assessment

Knowledge acquisition
(Knowing and remembering)

Action / awareness
(understanding and applying)

Synthesis / Innovation
(analysis, evaluation and innovation)

ASSESSMENT
assignments
activities
tests

case studies
translation tasks,
&
projects
practical task
exams

Read about topic & Raise questions
Find out (Work out)
Try out
Report-back, talk about the topic & make decisions

Key words to access knowledge
Easy reading knowledge resources
Comprehension and open questions
Knowledge-based learning - by doing Enquiry / investigations to find out more

Knowledge acquisition - action / awareness - synthesis / Innovation

ASSESSMENT
Assignments & case studies &= projects
Activities & translation tasks, & practical task
Tests &
Read about topic & Raise questions

Find out (Work out)

Try out

Report-back, talk about the topic & make decisions

Can ask and answer questions on the topic

Can explain things and find answers to questions

Analysis, synthesis, evaluation (15%) & innovation

Understanding (25%) & Applying (20%)

Knowing & Remembering (40%)

Can report / expand / apply knowledge

TEACH

ASSESS

(For & of learning)
Systems thinking:  
A key for learning to change
Systems thinking is necessary for learning in complex social ecological constellations

Interpersonal engagement, problem solving and action-taking develop with:

**Systems thinking** for appreciating complex constellations of risk and for shaping

**Anticipatory** competence to imagine future conditions that might enable a

**Normative** competence of reflexive re-imagining with

**Strategic** competence to initiative and sustain change

(Adapted Wiek, 2012)
How does systems thinking enhance learning and change practices?

Individual competence

Systems thinking

Complex problem constellation in the situation and history

Interpersonal

Strategic

Change strategies

Anticipatory

Non-intervention futures

Sustainability visions

Normative

(Adapted from Wiek et al. 2011)
Learning in a social context

What makes South Africa a special place for teaching and learning related to climate change?
Climate migration and innovation in a context of high climate variability

- Social ecological landscapes and sustainability
- Zuurbveld migrations and the colonial intrusion
- Gelesha
- Heritage-based social innovations

Eastern Cape Landscape change 1928 and Present

Wiersum & Cocks
Zuurveld Climate Migration

• **The Zuurveld** is the country contained between the ocean and the Bushman’s and Fish rivers.

• The Xhosa would move their herds to winter grazing on so-called sweet veld of the Amathole Mountains.

• Sweet veld pasture remained nutritious throughout the year but could not support continuous heavy grazing in dry years so cattle were returned to the Zuurveld in summer.

• Transhumance patterns were cut and dislocated when colonial boundaries included the Zuurveld and excluded its Xhosa occupants.

• Today stock is still migrated by truck but now much of the land is under conservation management as game parks.

(Mostert, 1993:236)
Gelesha:

The rise of the Orion constellation (Isilimela) signified the time for the practice of gelesha. (Image wileyonlinelibrary.com/journal/ird)

Gelesha . . .

- involved mid-winter ripping of the sod of the previous crop,
- followed by seed bed preparation after the first good spring rains.
- Ripping the soil was done during mid-winter (July),
- because during that time of the year the cattle (oxen) were still in fairly good condition...
- Ripping also left the soil surface in a rough, receptive state, improving the infiltration rate of soils.

Averbeke, 2003 in Denison et.al, 2012
A Framework for Learning-to-Change
Bring out Heritage practices (What was done and known in the past)

Bring together Complex constellation

Bring in Modern Expert Culture (What is now known about things)

Bring about Looking across

Looking back

Looking about

Looking across

A capabilities approach to social innovation
(Personal, social and environmental conversion factors)
Reduce resource use

Waste → Water

Biodiversity → Modern livelihood practices

Agriculture

Energy → Health

Enhance quality of life

Adapting to and mitigating climate change

Re-imagining more sustainable livelihoods

(Access, Equity, Consumption and Better Patterns of Practice)
Change practices for low carbon resilience development with enhanced quality of life

WATER (HKP: Water pot)
- Rainwater tank
- First flush
- Ceramic filters
- Filtering grey water

ENERGY (HKP: flame / coal)
- Clay stove
- Cobb charcoal oven
- Volcano kettle
- Sun stove
- Hot box
- Induction cooker
- Solar water heater
- Solar cell
- Wind generator

HEALTH (HKP: Slow food)
- Tippy hand washer
- Soured milk
- AmaRewu
- Sourdough bread
- Hand mill

AGRICULTURE (HKP Izala)
- Flip composter
- Worm farm
- Wire-tie shade house
- Chicken tractor
- Biochar drum
- Sun drier

BIODIVERSITY (HKP: Take forest)
- Acacia fire woodlot
- Micro nursery
- Micorrhizal
- 3 step potting soil

TRANSPORT
- Solar e-bike
- Trailer

SEWAGE (HKP: Dry toilet)
- Urine separation toilet

WASTE (HKP: Izalene)
- Reuse padding
- Hand made paper
- Making fire-bricks

Assessing low carbon resilience development

| Quality of life enhanced | Resource use reduced | Ecosystems Restored | Carbon footprint mitigated |
ENERGY

Fire gardens
Stoves
And
Cooking bags

Acacia fire garden
Drying drum
Pot on ceramic plate
Volcano Kettle
Wood stoves
Hot bags
Cobb oven

igoqo
HEALTH

Hand washing
Honey
and
Fermented foods

iselwa
AGRICULTURE

Small-scale
Organic
Food
Gardens

imifino
Biodiversity

Micro-nursery
Potting soil
and
Mycorrhiza

1:1:1 Potting soil
Recycled trays
Mycoroot

ihlathi
**WASTE**

- Grey water
- Fire bricks
- Worm farms & Dry toilets

Urine separation dry toilet

ethuthwini
A partnership programme

Developing South Africa's GreenMatter®
References:


Wiersum, K.F. and Cocks, M. (In Press) *Enduring cultural landscapes of amaXhosa in former Ciskei*. Forest and Nature Conservation Policy group, Wageningen University, the Netherlands and Institute of Social and Economic Research, Rhodes University, South Africa