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

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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
Coleen Vogel, Sharu, Maser & Priya Vellabah

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
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

Read about topic & Raise questions

Find out (Work out)

Try out

Report-back, talk about the topic & make decisions

Knowledge acquisition
( Knowing and remembering)

action / awareness
( understanding and applying)

synthesis / Innovation
( analysis, evaluation and innovation)

<table>
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<tr>
<th>ASSESSMENT</th>
<th>assignments</th>
<th>case studies &amp; projects</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>activities</td>
<td>translation tasks, practical task</td>
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<td>tests</td>
<td>exams</td>
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</table>
Read about topic & Raise questions

Find out (Work out)

Try out

Report-back, talk about the topic & make decisions

Analysis, synthesis, evaluation (15%) & innovation

Can ask and answer questions on the topic

Can explain things and find answers to questions

Can report / expand / apply knowledge

Understanding (25%) & Applying (20%)

Knowing & Remembering (40%)

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
- Socio-cultural Practice

- Strategic
- Interpersonal

- Anticipatory
  - Non-intervention futures
  - Sustainability visions

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

Waste

Water

Biodiversity

Energy

Agriculture

Health

Modern livelihood practices

Enhance quality of life

Adapting to and mitigating climate change

Restore habitats & ecosystem services

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
- Micorrhzyal
- 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

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<th>Quality of life enhanced</th>
<th>Resource use reduced</th>
<th>Ecosystems Restored</th>
<th>Carbon footprint mitigated</th>
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WATER
Tanks
Testing and Filters

 imbiza
ENERGY

- Fire gardens
- Stoves
- And
- Cooking bags

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

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