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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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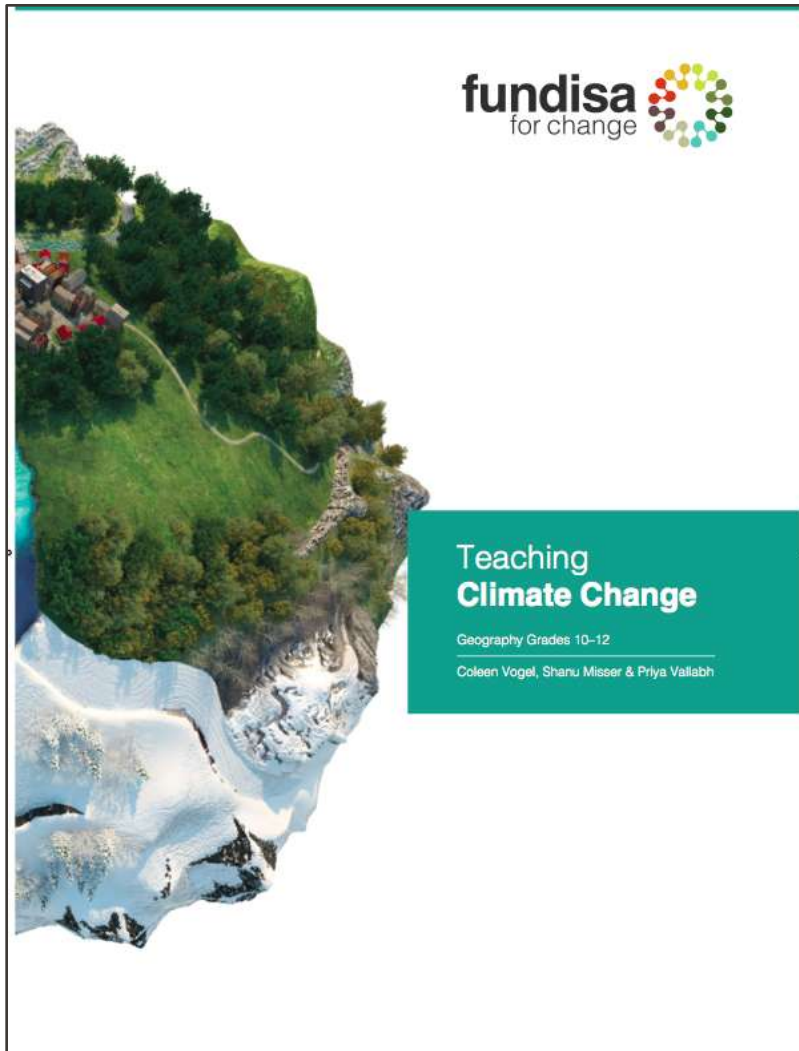
TEACHING CLIMATE CHANGE: A CAPS curriculum topic


FET- Climate Change (G-G10-12)

Senior- Climate Change (NS-G7-9)

IP - Foundations of weather and climate

FET Climate Change Module



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**Teaching
Climate Change**

Geography Grades 10-12
Coleen Vogel, Shanu Misser & 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

Senior Phase Climate Change Module



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**Teaching
Climate Change**

Natural Sciences Grades 7–9
Susan Brundrit



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
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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, & exams
	&	projects & practical task

TEACH

Report-back,
talk about the
topic
& make
decisions

Analysis,
synthesis,
evaluation
(15%) &
innovation

ASSESS
(For & of learning)

Find out
(Work out)
Try out

Can report / expand
/apply knowledge

Understanding
(25%)
&
Applying
(20%)

Read about
topic
&
Raise
questions

Can explain things and
find answers to
questions

Knowing
&
Remembering
(40%)

Can ask and answer questions on the
topic



Systems thinking:

A key for learning to change

Systems thinking is necessary for learning in complex social ecological constellations

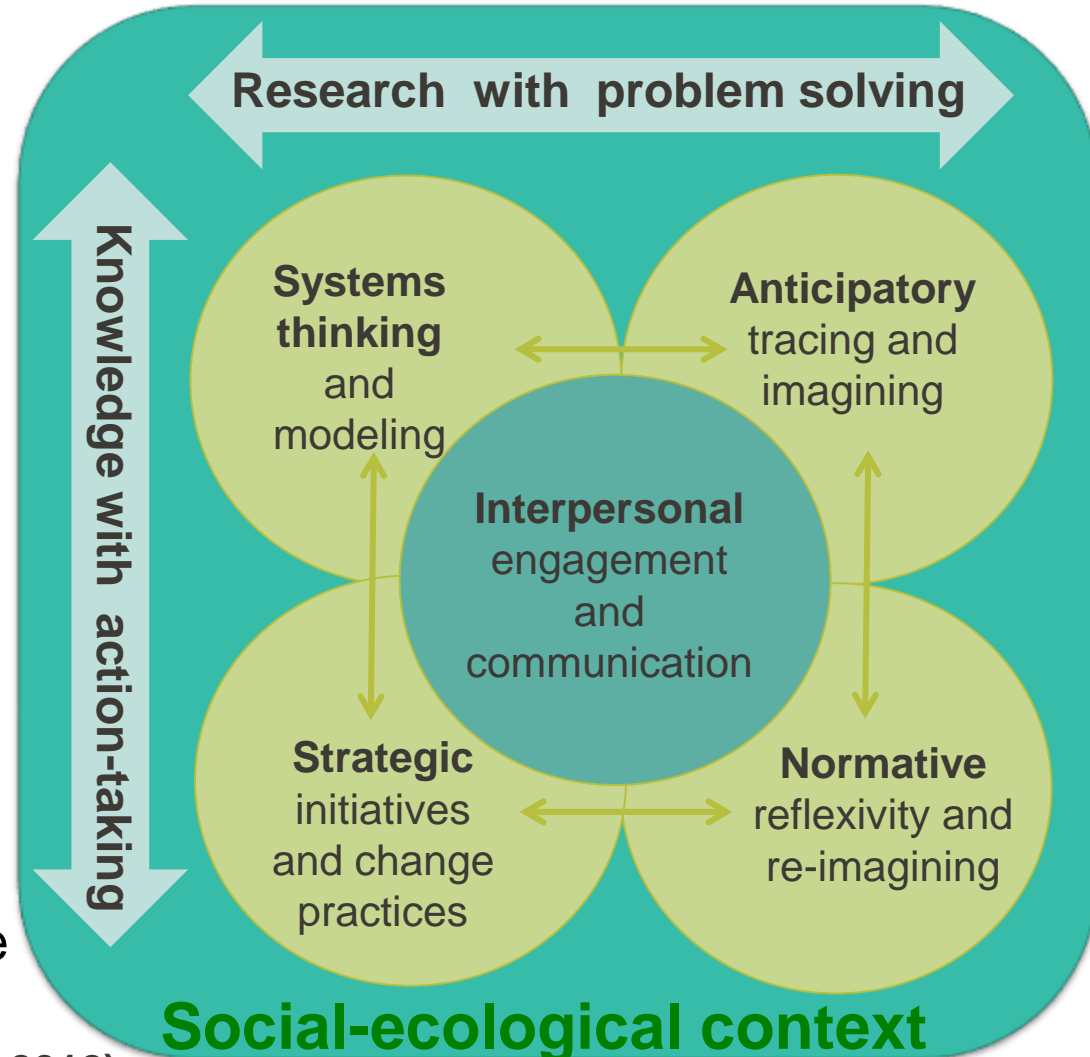
Interpersonal engagement, problem solving and action-taking develop with:

Systems thinking for appreciating complex constellations of risk and for shaping

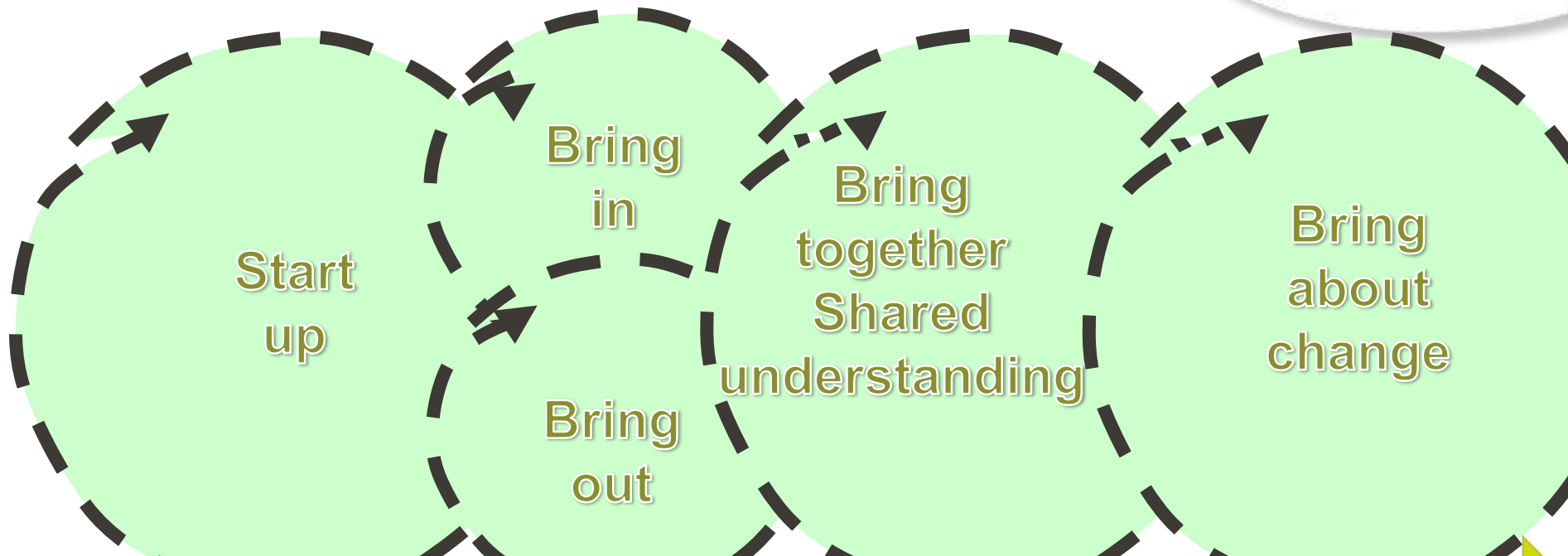
Anticipatory competence to imagine future conditions that might enable a

Normative competence of reflexive re-imagining with

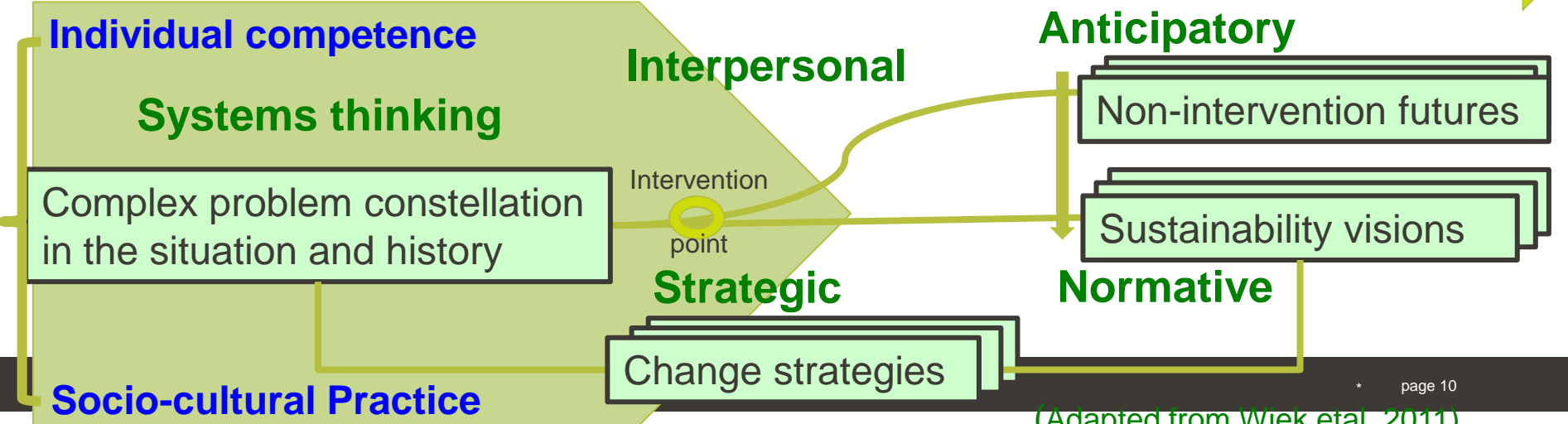
Strategic competence to initiative and sustain change



(Adapted Wiek, 2012)



How does systems thinking enhance learning and change practices?

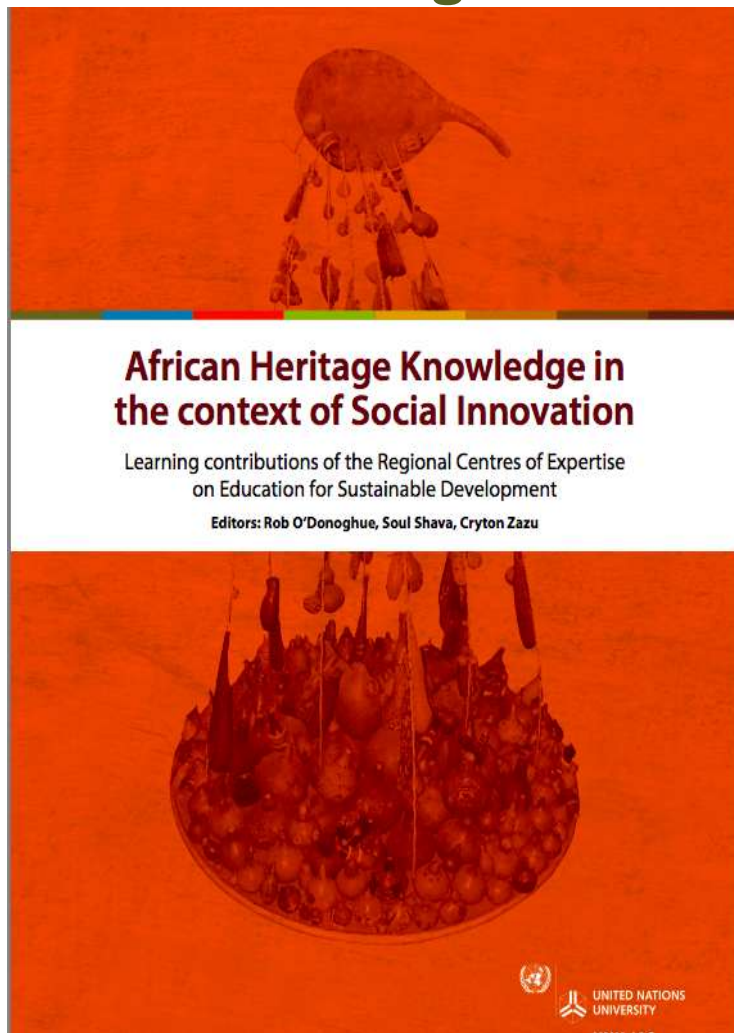




Learning in a social context

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

[http://www.ias.unu.edu/resource_centre/UNU Booklet MB2013 FINAL Links v12.pdf](http://www.ias.unu.edu/resource_centre/UNU_Booklet_MB2013_FINAL_Links_v12.pdf)

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

Heritage practices

(What was done and known in the past)

Modern Expert Culture

(What is now known about things)

Bring
out

Bring
about

Bring
in

Bring
together

Looking across

Looking
back

Looking
about

Complex constellation

of social - ecological risk

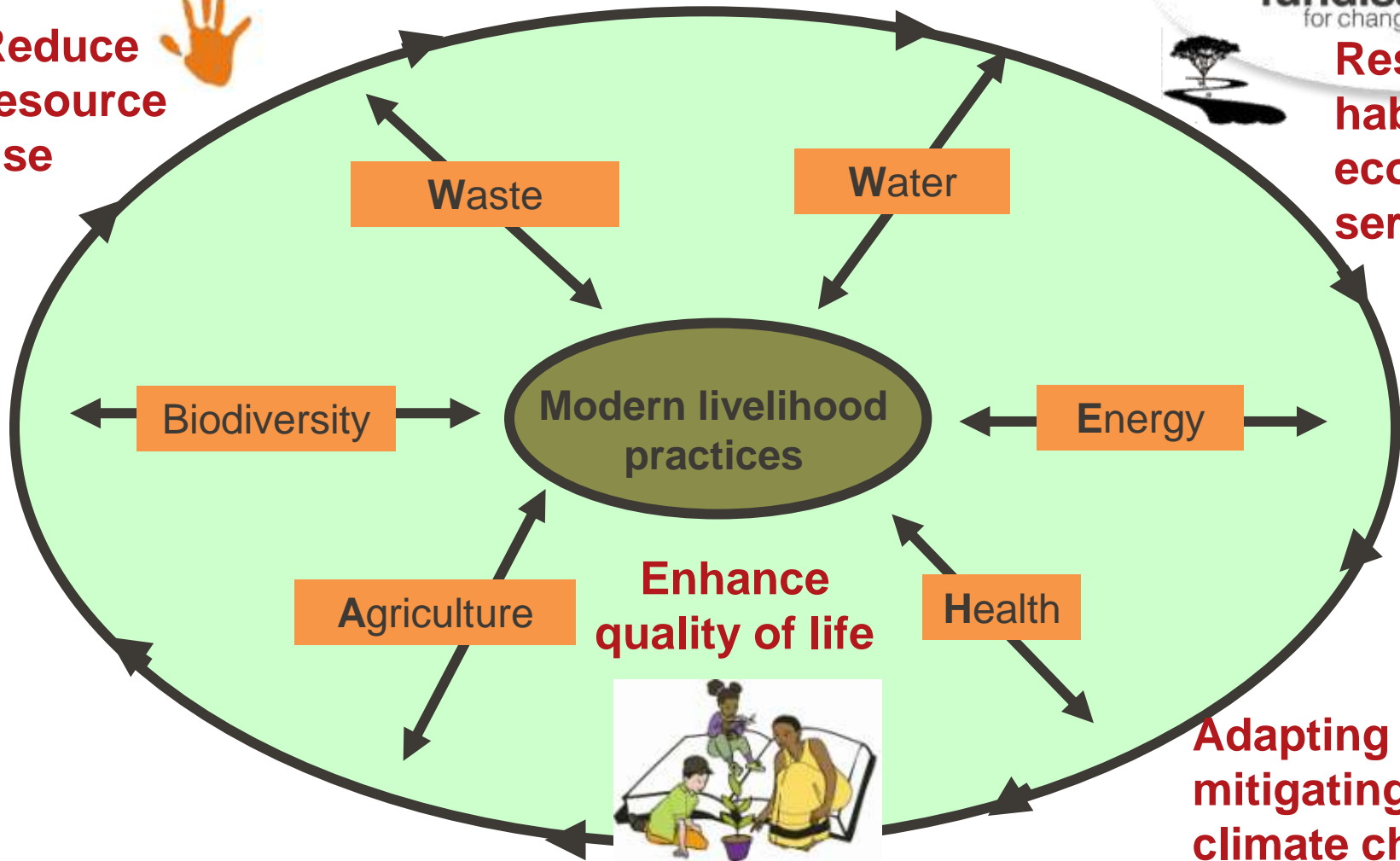
A capabilities approach to **social innovation**

(Personal, social and environmental conversion factors)



**Restore
habitats &
ecosystem
services**

**Reduce
resource
use**



**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







ENERGY

Fire gardens
Stoves
And
Cooking bags



igoqo

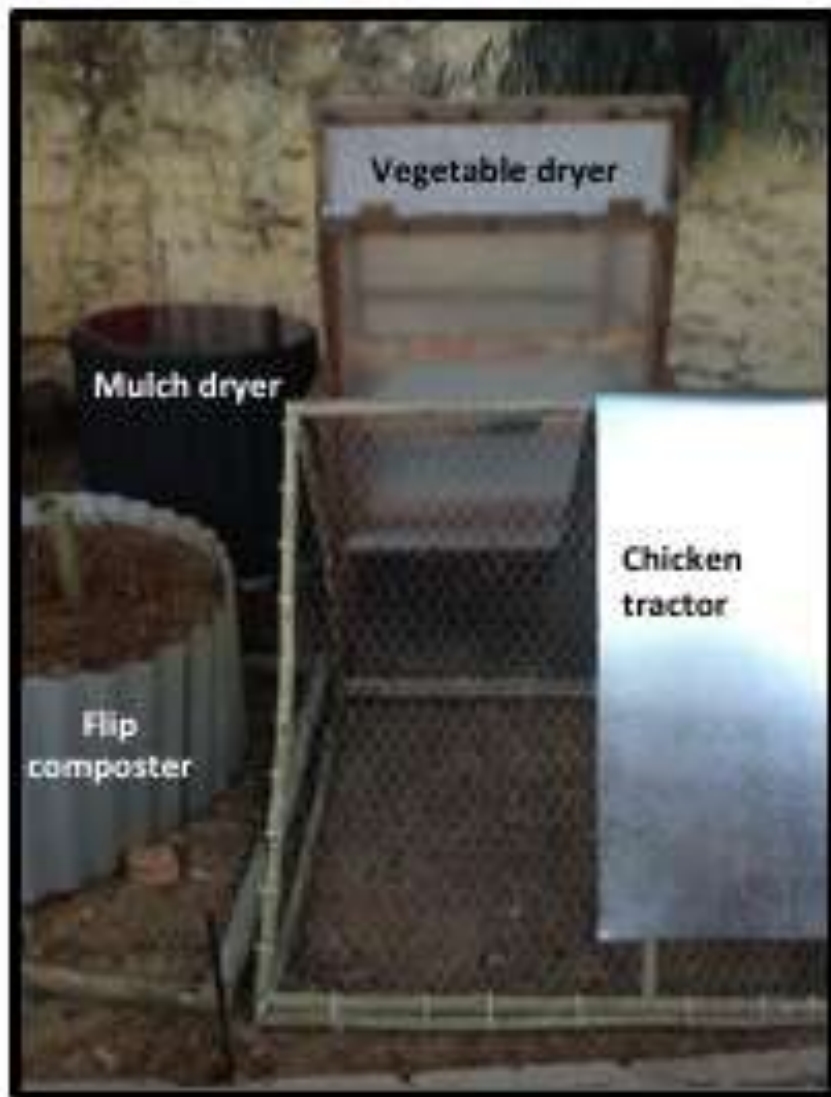


HEALTH

Hand washing
Honey
and
Fermented foods



iselwa



AGRICULTURE

Small-scale
Organic
Food
Gardens



imifino

BIODIVERSITY

Micro-nursery
Potting soil
and
Mycorrhiza



ihlathi



WASTE

Grey water
Fire bricks
worm farms &
Dry toilets



ethuthwini



A partnership programme for environmental learning and teacher education

-  environmental affairs
-  basic education
-  water affairs
-  RHODES UNIVERSITY
-  environmental
-  SANBI
-  delta environmental
-  UNISA
-  giz
-  GreenMatter



Teaching Indigenous Knowledge and Technology

Natural Sciences and Technology Grades 4-6

Lead Writers: A Rob O'Donnell

A partnership programme



References:

- Denison, J. and Wotshela (2012) An overview of indigenous, indiginised and contemporary water harvesting and conservation practices in South Africa. In *Irrigation and drainage* 61 pp. 7-23. Wileyonline.com. DOI: 10.1002/ird.1689.
- Kotze, E. Wakkerstroom: Grasslands, fire and war – past perspectives and present issues. In Edgecombe, R. and Guest, B. *South Africa's Environmental History: Cases and Comparisons*. Cape Town, Davis Philip Publishers.
- McAllister, J. (2002) Fire and the South African Grassland Biome. In Edgecombe, R. and Guest, B. *South Africa's Environmental History: Cases and Comparisons*. Cape Town, Davis Philip Publishers.
- Mostert, N. (1993) *Frontiers: The epic of South Africa's creation and the tragedy of the Xhosa People*. London, Pimlico.
- Wiek, A. Withycombe, L. and Redman, C.L. (2011) Key competencies in sustainability: a reference framework for academic program development. Integrated Research System for Sustainability Science, United Nations University, and Springer.
- 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