PLANNING FOR CLIMATE CHANGE AND RAPID URBANISATION

CONTINUING PROFESSIONAL DEVELOPMENT, LECTURE SERIES FOR PROFESSIONALS

Image credit:
Morley von Sternberg for Allies and Morrison

Commonwealth Association of Architects

Engaging with the UN 2030 Sustainable Development Goals

Welcome to the CAA's lecture series for professionals, comprising a pilot programme of seven lectures from a range of subject matter experts, the aim of which is to help promote greater awareness of the UN 2030 Sustainable Development Goals together with issues related to climate change and rapid urbanisation.

By the end of this series, we hope participants will be able to better understand, engage with and contribute to the UN 2030 Sustainable Development Goals, and will be better equipped to apply the principles of sustainable development in their daily work at city and building scale.

The authors recognise that while the principles of sustainable development may be universal, their application will vary depending on variables such as culture and climate. Participants are therefore invited to consider how the principles outlined in each lecture might apply to their local circumstances and conditions.

Lecture Series

Overview of the seven lectures forming part of this series:

1. **Introduction to the UN 2030 Sustainable Development Goals**, Mina Hasman, SOM
   Provides an overview of the UN 2030 SDGs together with other related international agreements, and describes the importance of the Goals for Built Environment Professionals.

2. **Planning for Rapid Urbanisation,** Ben Bolgar, The Prince's Foundation
   Outlines a framework for use in secondary cities which are experiencing rapid growth but which may have little or no access to professional planning expertise.

3. **Planned City Extensions,** Alfredo Caraballo, Allies and Morrison
   Provides a reminder of key master-planning and urban design principles such as: site analysis, micro-climate design, density, mixed use, walkability etc.

4. **Resilient Infrastructure**, Ian Carradice, Arup
   Explains the context, relevance and drivers to develop resilient infrastructure by adopting an integrated design approach and considering planetary solutions to address climate related challenges..

5. **Climate Responsive Design,** Peter Clegg, Isabel Sandeman and Rachel Sayers from FCB Studios, and Rafiq Azzam, Shatotto
   Part one is focused on 'A Manifesto for delivering Climate Responsive Design', and Part Two, entitled 'Collaborating for Sustainable Development', provides a case study of how the principles of Climate responsive design have be used on a project in Bangladesh to create an inspiring and comfortable educational environment for the Aga Khan Academies Unit.

6. **Heritage-led Regeneration**, Geoff Rich, Feilden Clegg Bradley Studios
   Describes the value of heritage led regeneration in terms of the reuse of existing buildings, and the potential to generate social and economic development.

7. **Sustainable Outcomes Guide**, Gary Clark, HOK London Studio
   Provides a practical explanation of the outcomes that need to be delivered if we are to achieve development which is sustainable. Includes meaningful, measurable targets and associated metrics.

FeildenCleggBradleyStudios

A Manifesto for Climate Responsive Design

Guidelines for designing community buildings in East Africa

Peter Clegg and Isabel Sandeman

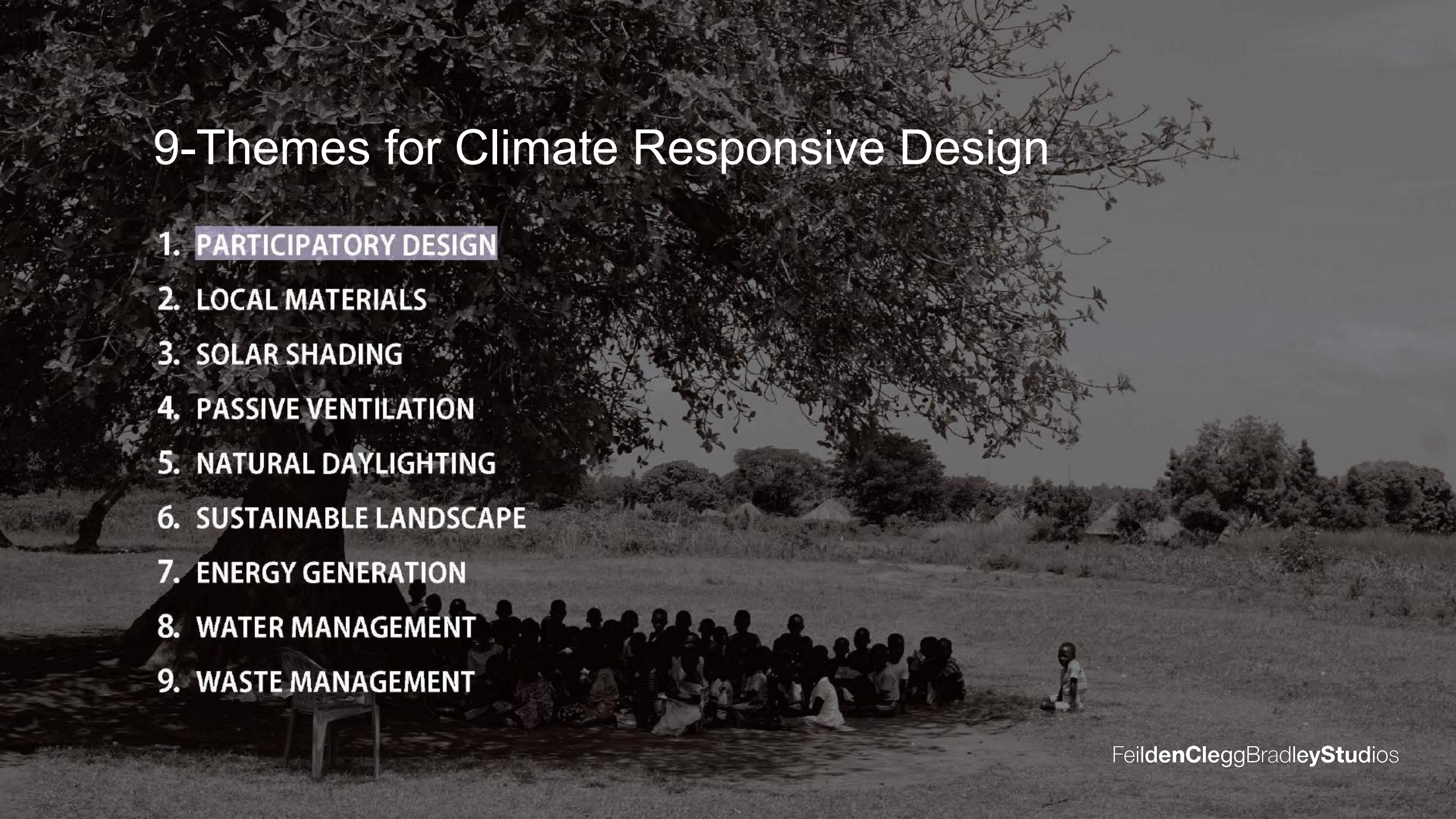
June 2020

FeildenCleggBradleyStudios

9-Themes for Climate Responsive Design

1. PARTICIPATORY DESIGN
2. LOCAL MATERIALS
3. SOLAR SHADING
4. PASSIVE VENTILATION
5. NATURAL DAYLIGHTING
6. SUSTAINABLE LANDSCAPE
7. ENERGY GENERATION
8. WATER MANAGEMENT
9. WASTE MANAGEMENT

FeildenCleggBradleyStudios



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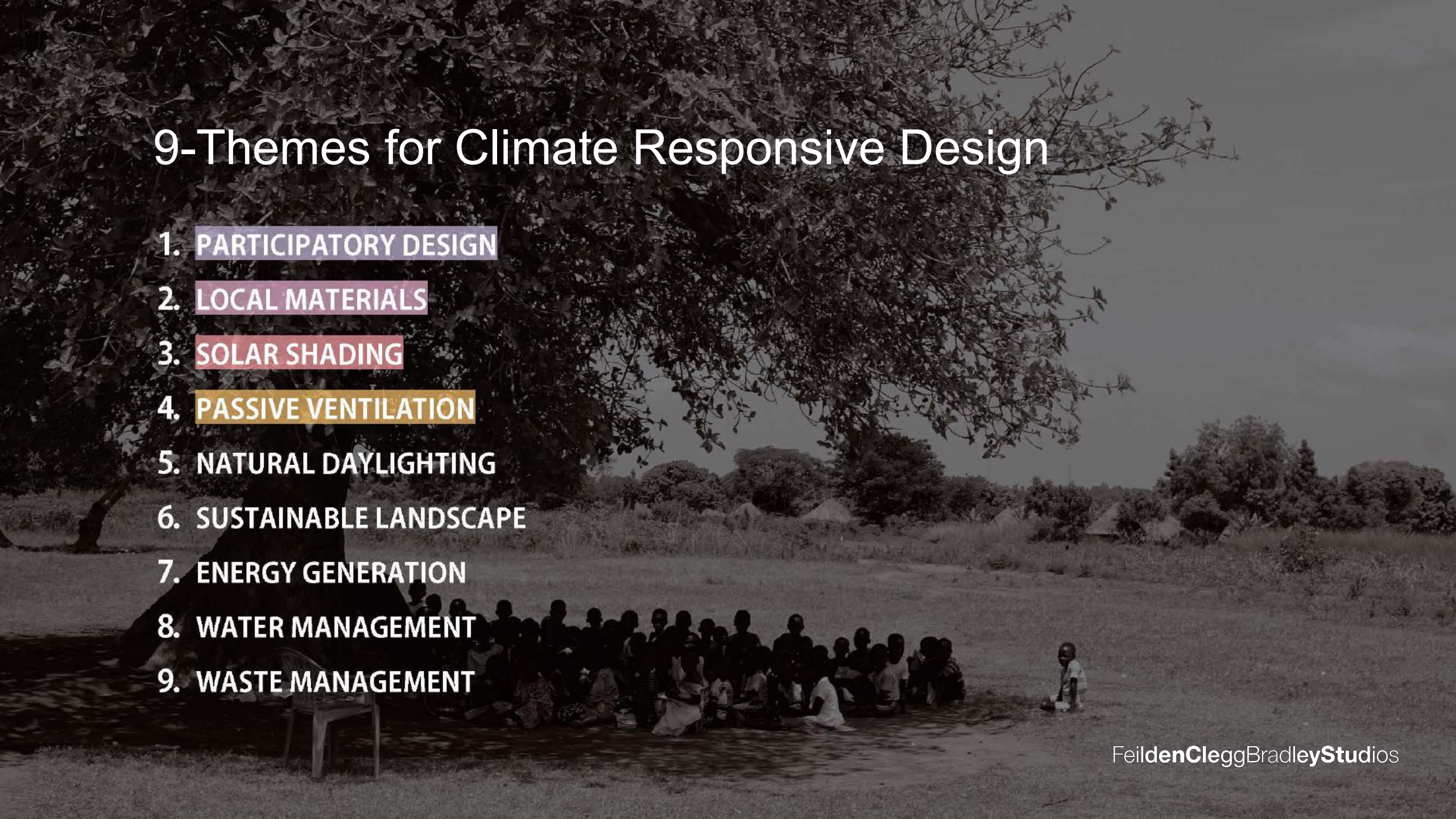

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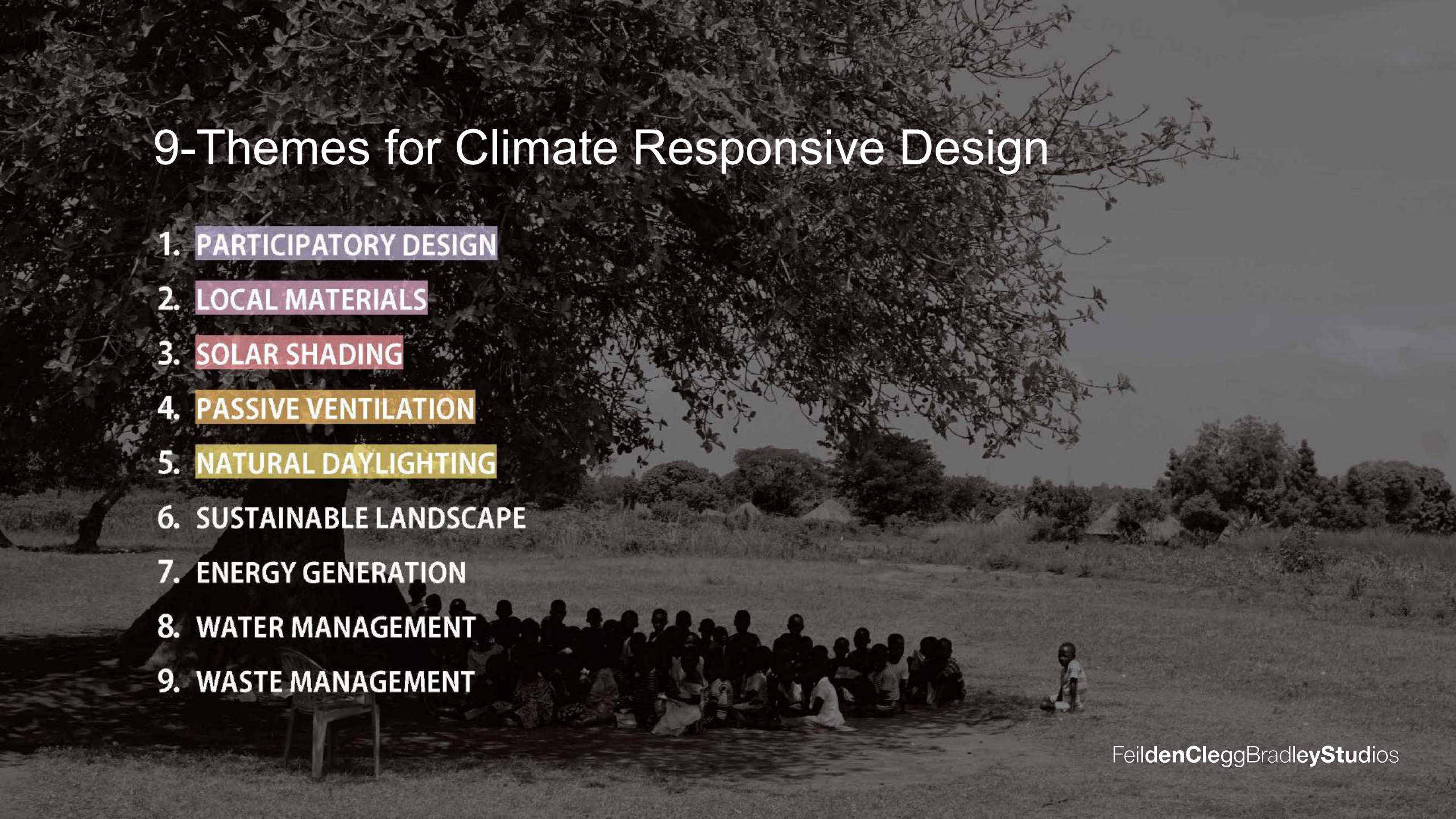
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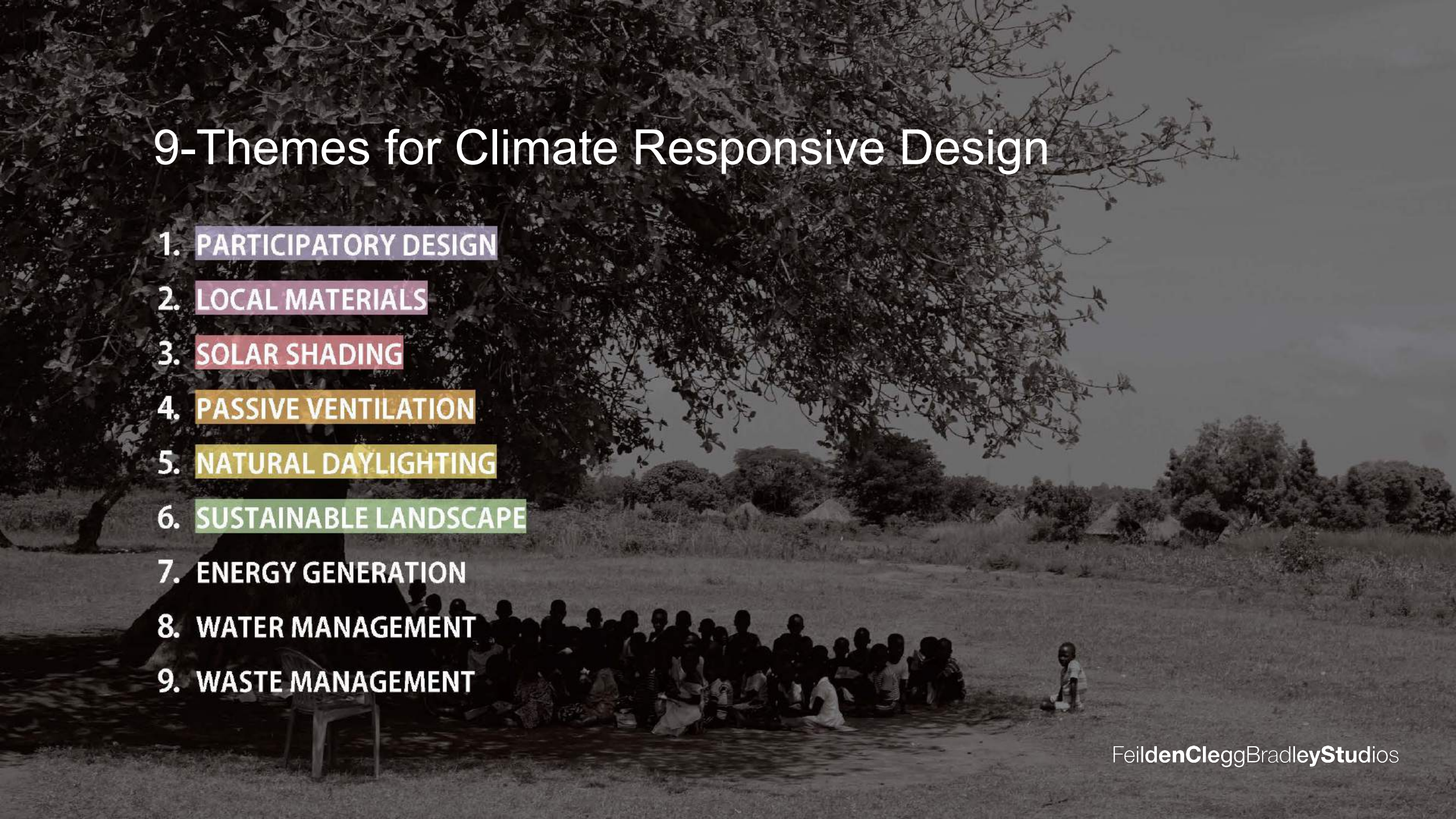
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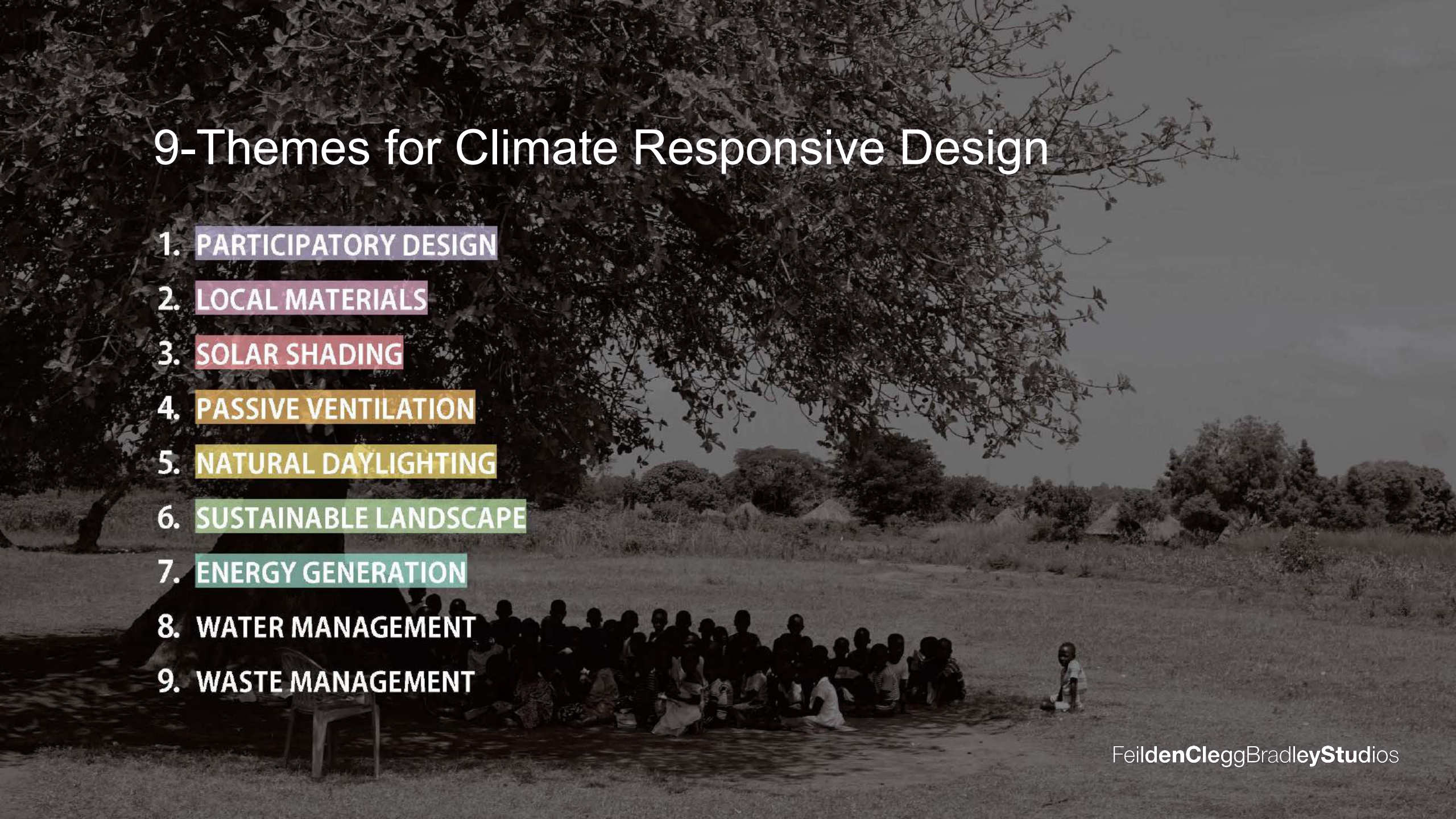
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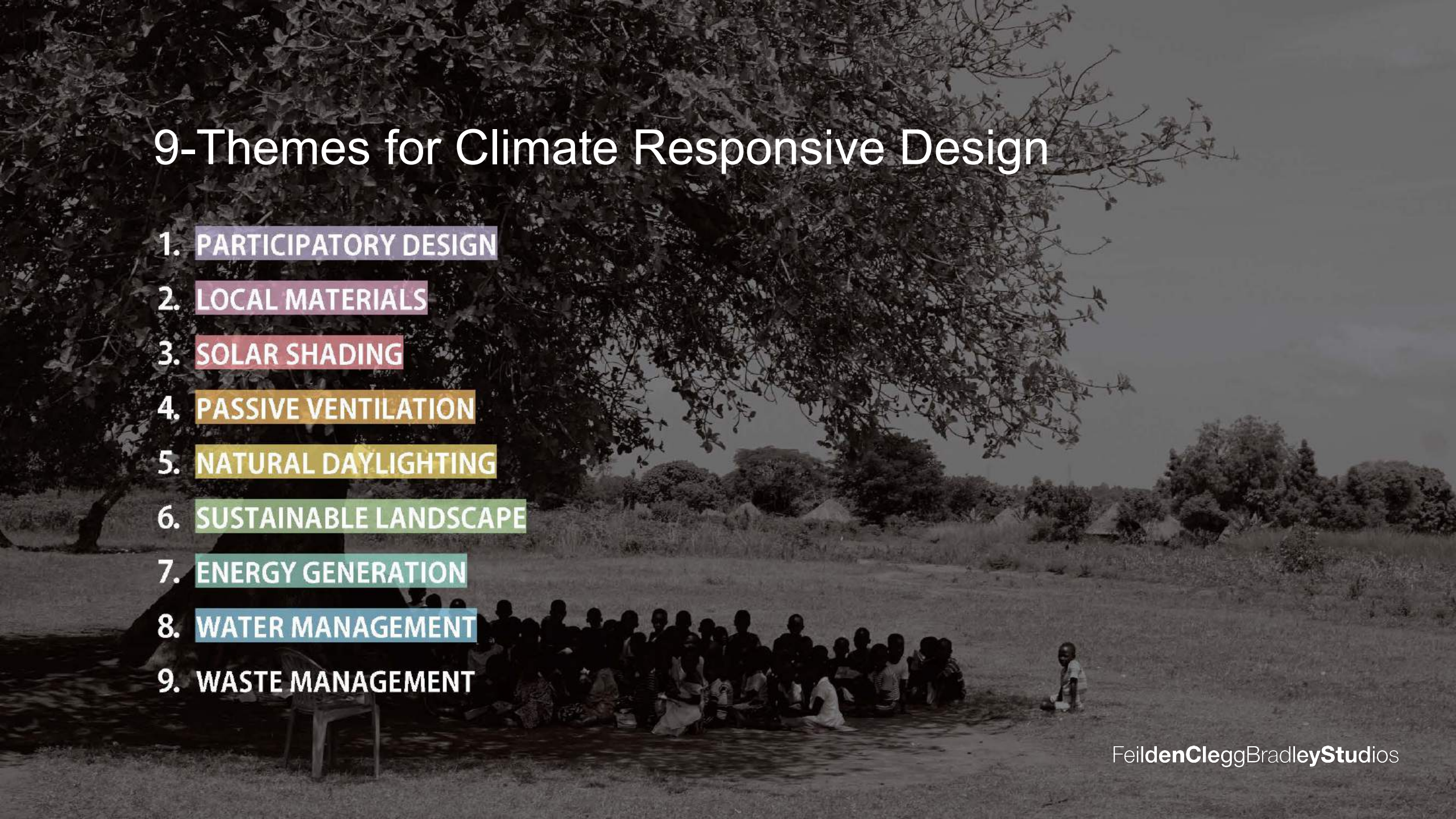

FeildenCleggBradleyStudios

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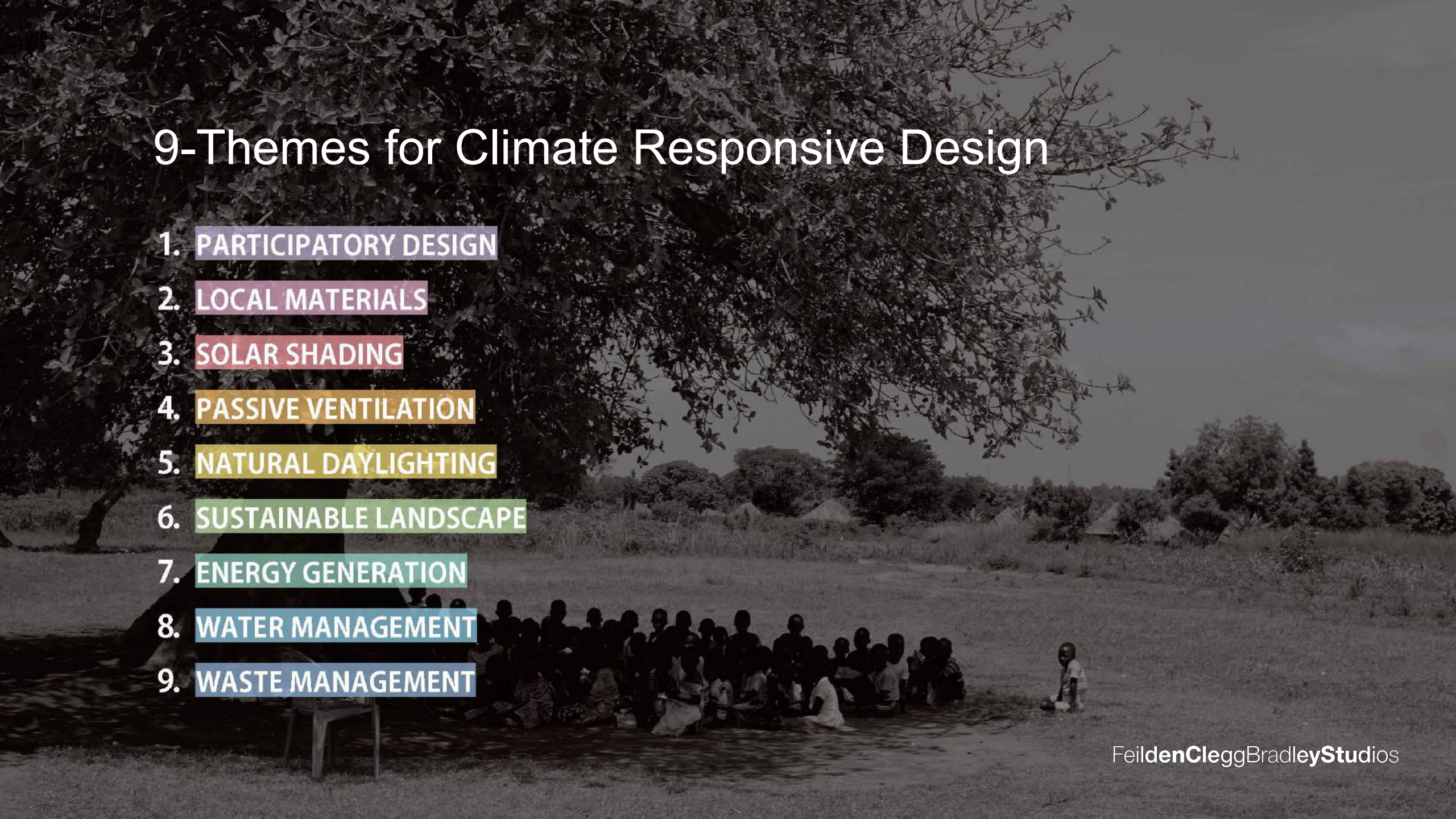

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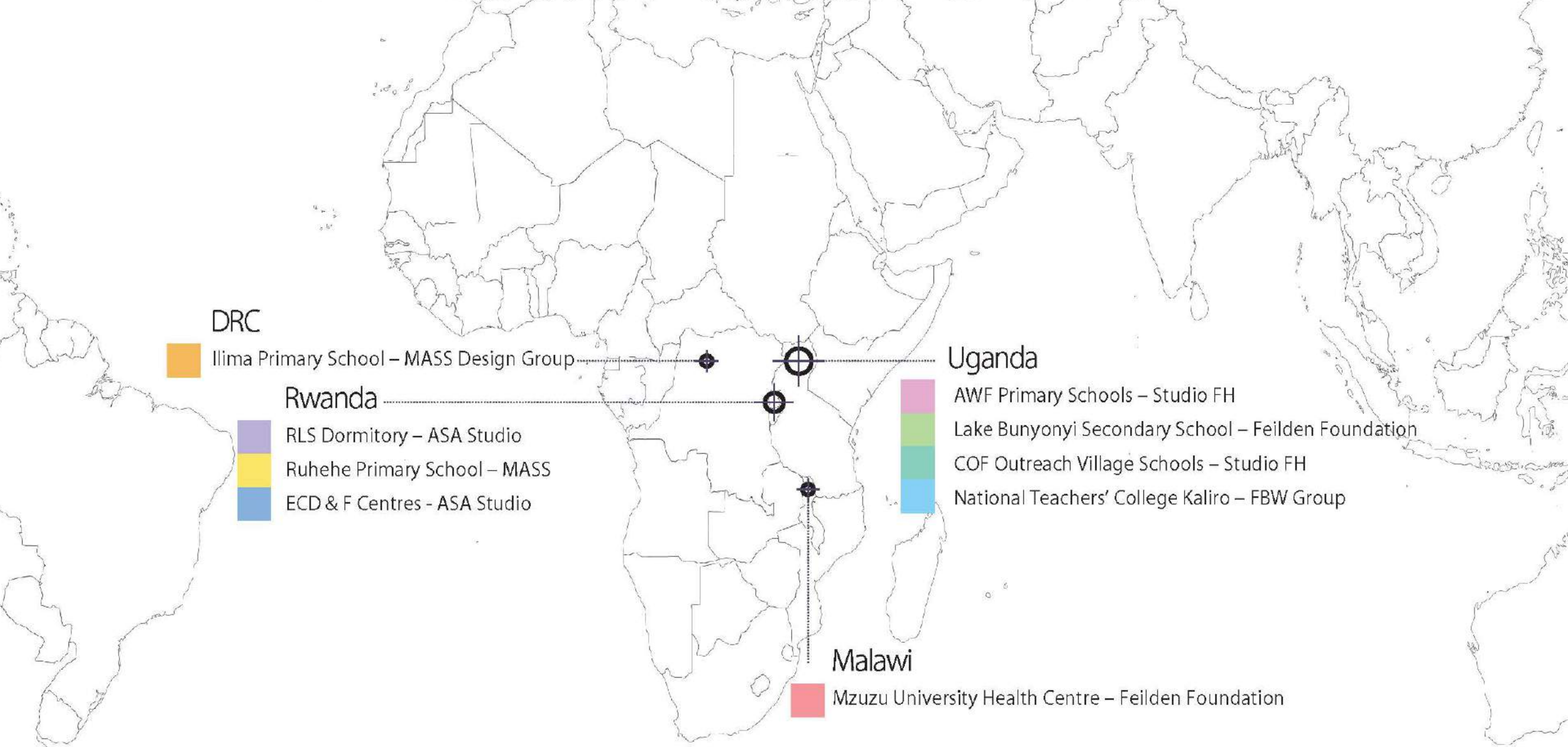

DRC
Ilima Primary School – MASS Design Group
Rwanda
RLS Dormitory – ASA Studio
Ruhehe Primary School – MASS
ECD & F Centres - ASA Studio
Uganda
AWF Primary Schools – Studio FH
Lake Bunyonyi Secondary School – Feilden Foundation
COF Outreach Village Schools – Studio FH
National Teachers' College Kaliro – FBW Group
Malawi
Mzuzu University Health Centre – Feilden Foundation

Feilden Foundation

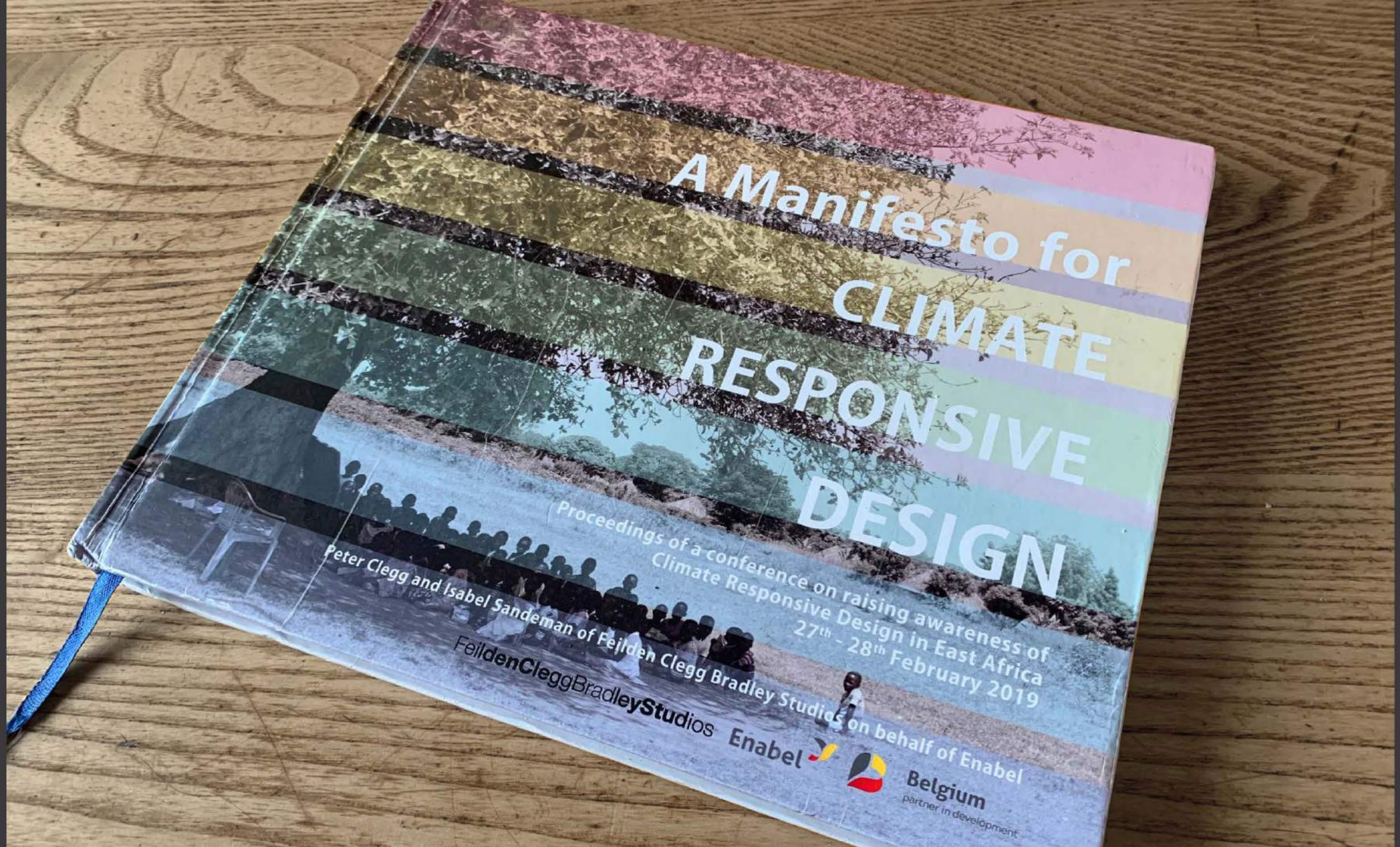
FeildenCleggBradleyStudios


LAKE BUNYONYI CHRISTIAN COMMUNITY
VOCATIONAL SEC. SCHOOL
MOTTO: SKILLS FOR SUSTAINABLE DEVELOPMENT

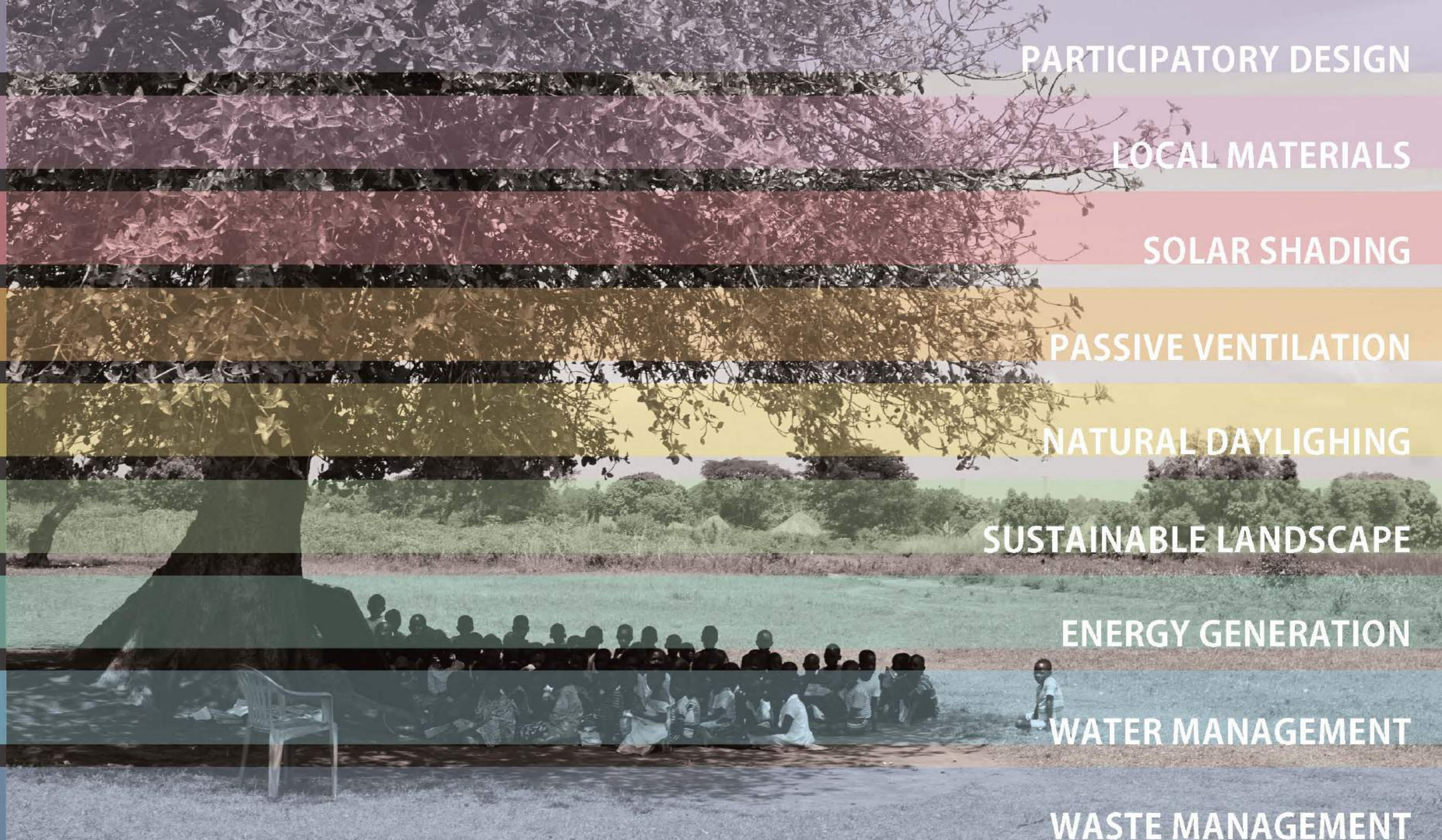

LBCCVS

Raising Awareness for Climate Responsive Design in East Africa

February 2019


A Manifesto for
CLIMATE
RESPONSIVE
DESIGN
Proceedings of a conference on raising awareness of
Climate Responsive Design in East Africa
27th - 28th February 2019
Peter Clegg and Isabel Sandeman of Feilden Clegg Bradley Studios on behalf of Enabel
FeildenCleggBradleyStudios
Enabel
Belgium
partner in development

A Manifesto for CLIMATE RESPONSIVE DESIGN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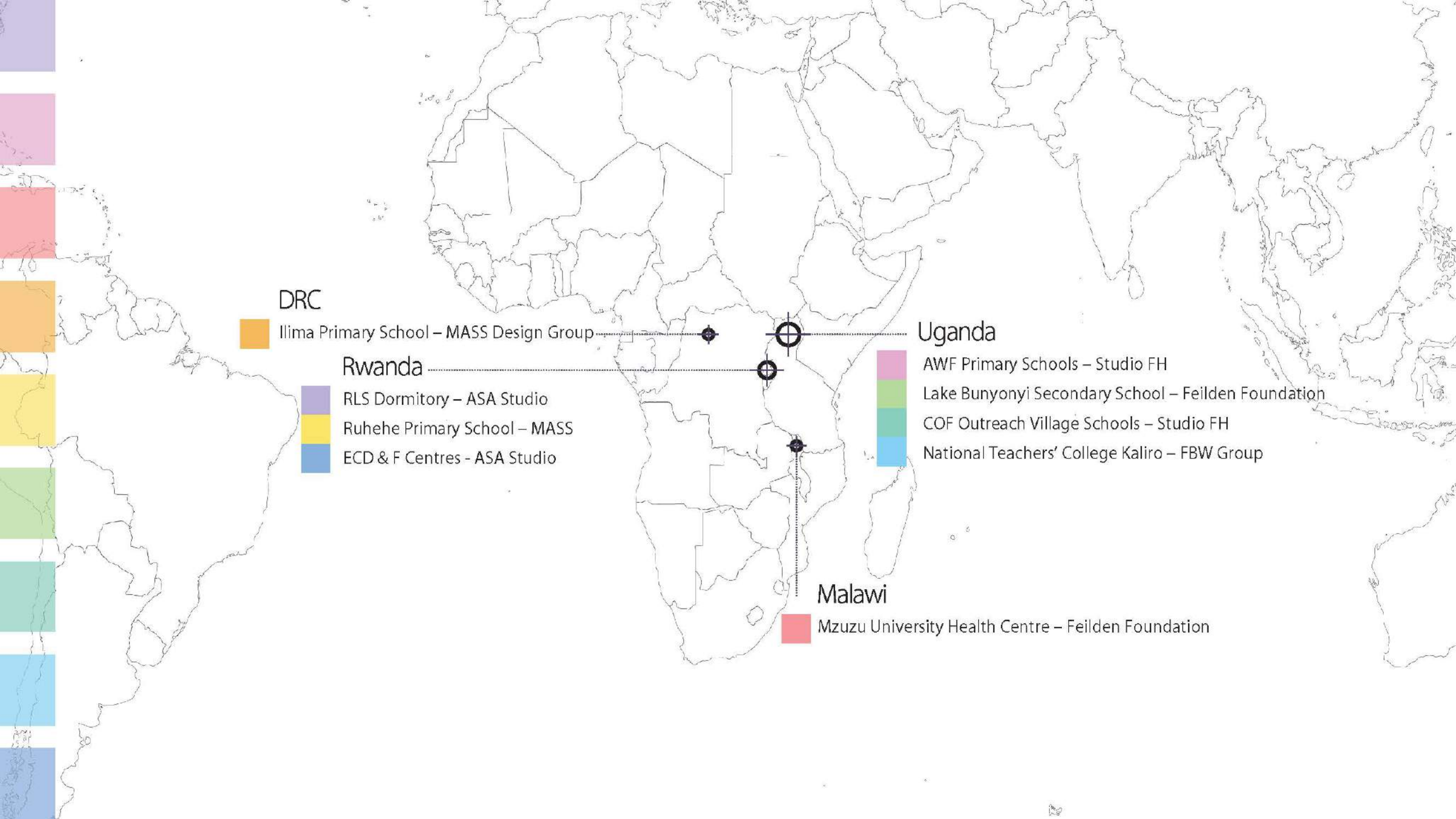
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1 NO POVERTY
4 QUALITY EDUCATION
5 GENDER EQUALITY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
17 PARTNERSHIPS FOR THE GOALS

PARTICIPATORY DESIGN

RWAMAGANA LEADERS' SCHOOL DORMITORY

RWANDA

ASA Studio

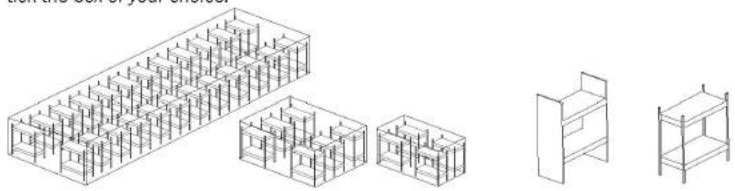
1. DORMITORY

A. Principal functions - What would you like to do in the bedroom of you dormitory? Please write your answer.

B. Time - What time of the day are you in the bedroom of your dormitory and for how long?

from .... to....
from .... to....
from .... to....
from .... to....

C. Interior - How many boys would you like to share your room with? What kind of bed would you prefer? Please tick the box of your choice.



☐ ☐ ☐ ☐ ☐

D. Aesthetics - What do would you like your dorm to look like? Colors, materials, texture? Please tick the boxes of your choice.

☐ ☐ ☐ ☐ ☐ ☐

2. COMMON SPACE

A. Principal functions - What would you like to do in the common space of your dormitory? Please write your answer.

B. Time - How much time would you spend in the common space to perform the activities you wrote?

from .... to....
from .... to....
from .... to....
from .... to....

C. Interior - What would like your common space to be like? What kind of furnitures and what kind of spaces would you enjoy? Please tick the boxes of your choice.

☐ ☐ ☐ ☐ ☐

D. Aesthetics - What do would you like your dorm to look like? Colors, materials, texture? Please tick the boxes of your choice.

☐ ☐ ☐ ☐ ☐ ☐

1. DORMITORY

A. Principal functions - What would you like to do in the bedroom of you dormitory? Please write your answer.

reading	1,2,3,4,5,7,9
sleeping	1,2,3,4,5,7,9
sports (physical excersise)	1,5,7
playing games (cards)	2,3,6
riding washing machine	3,7
hanging out	4,5,9
everything you mentioned	6
taking baths	7
study	7,8
would like to have chairs	8

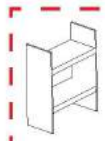
B. Time - What time of the day are you in the bedroom of your dormitory and for how long?

weekdays: 4 pm - 5 pm , 7 pm - 6 am, 7 am- 8 am
weekends: all day (1 pm- 5 pm sports)

C. Interior - How many boys would you like to share your room with? What kind of bed would you prefer? Please tick the box of your choice.

1,9

2,3,4,5, 6,7,8



1,2,3,4,5, 6,7,8,9

D. Aesthetics - What do would you like your dorm to look like? Colors, materials, texture? Please tick the boxes of your choice.

7,9

4, 5,6,8

8

2,3,6,7

9,

1,

2. COMMON SPACE

A. Principal functions - What would you like to do in the common space of your dormitory? Please write your answer.

reading	1,3,6,7,9
sleeping	1,9
sports (physical excersise)	1,2,3,4,5,6,9
playing games (cards)	3,9
washing machine	7,9
hanging out	1,2,3,5,9
study	7,9
informal classes	1,9
hammock	3,4,5,9
cinema	5,9
swing	6,9

B. Time - How much time would you spend in the common space to perform the activities you wrote?

at least 2 hours a day
weekends and after class

C. Interior - What would like your common space to be like? What kind of furnitures and what kind of spaces would you enjoy? Please tick the boxes of your choice.

7,8,9

4,8

1,5

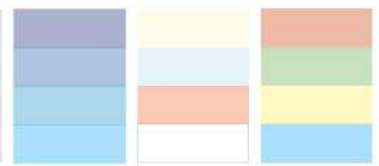
2,3,6,7,9

D. Aesthetics - What do would you like your dorm to look like? Colors, materials, texture? Please tick the boxes of your choice.

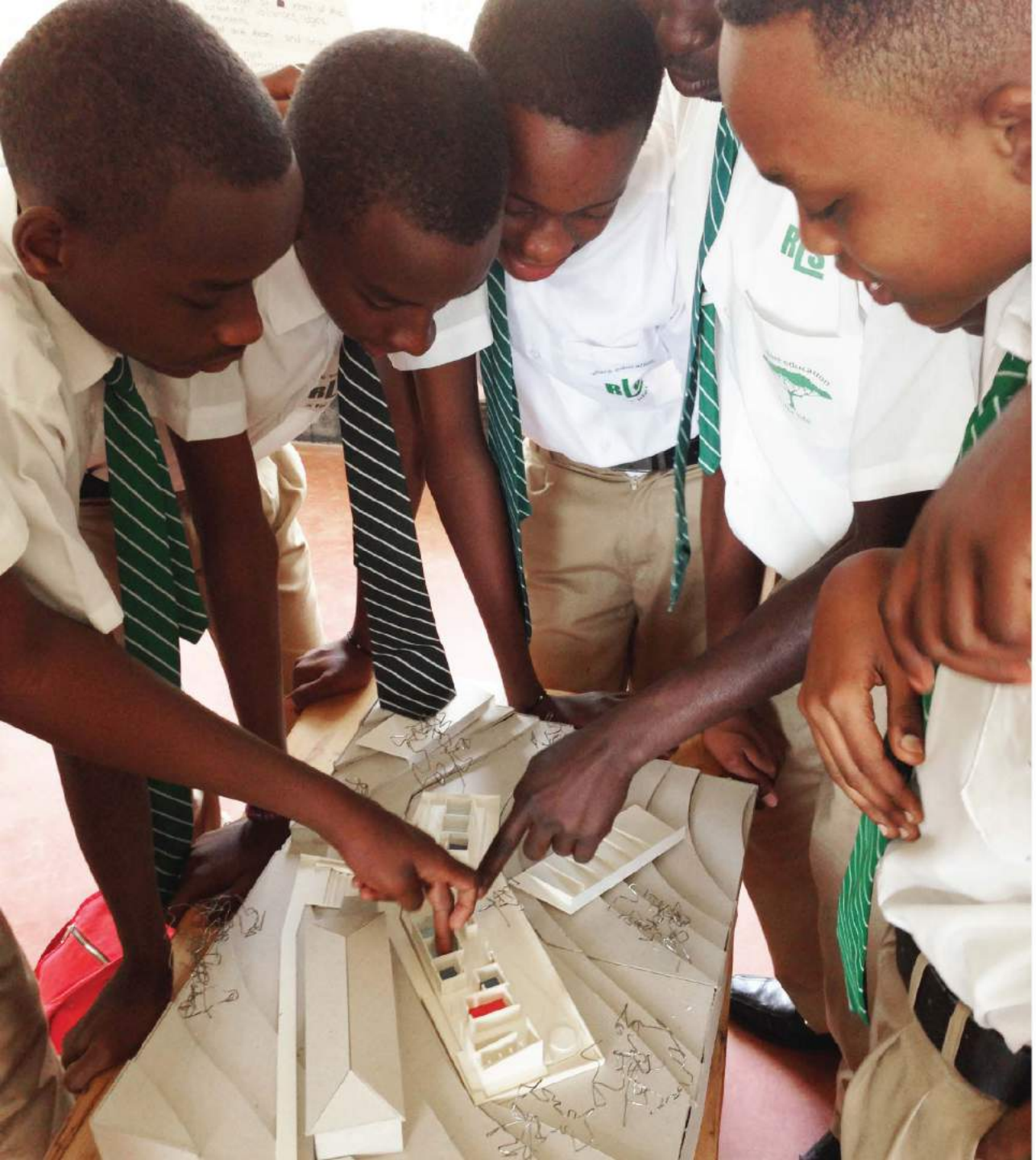
7,

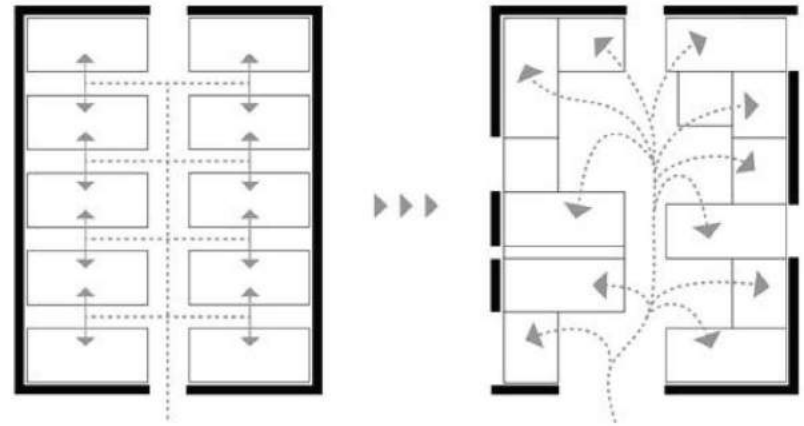
1,2,3,4,5, 6,8,

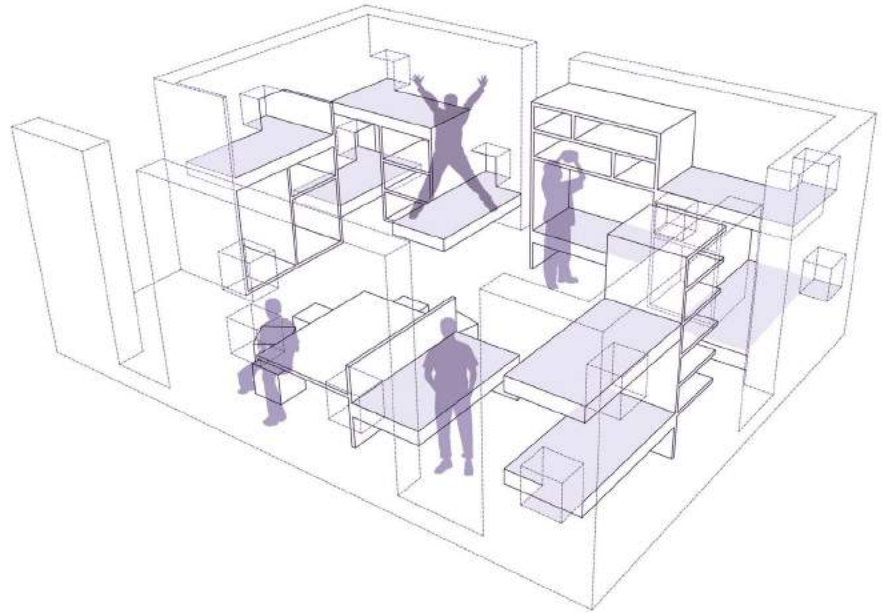
8,9,7



3,9







8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

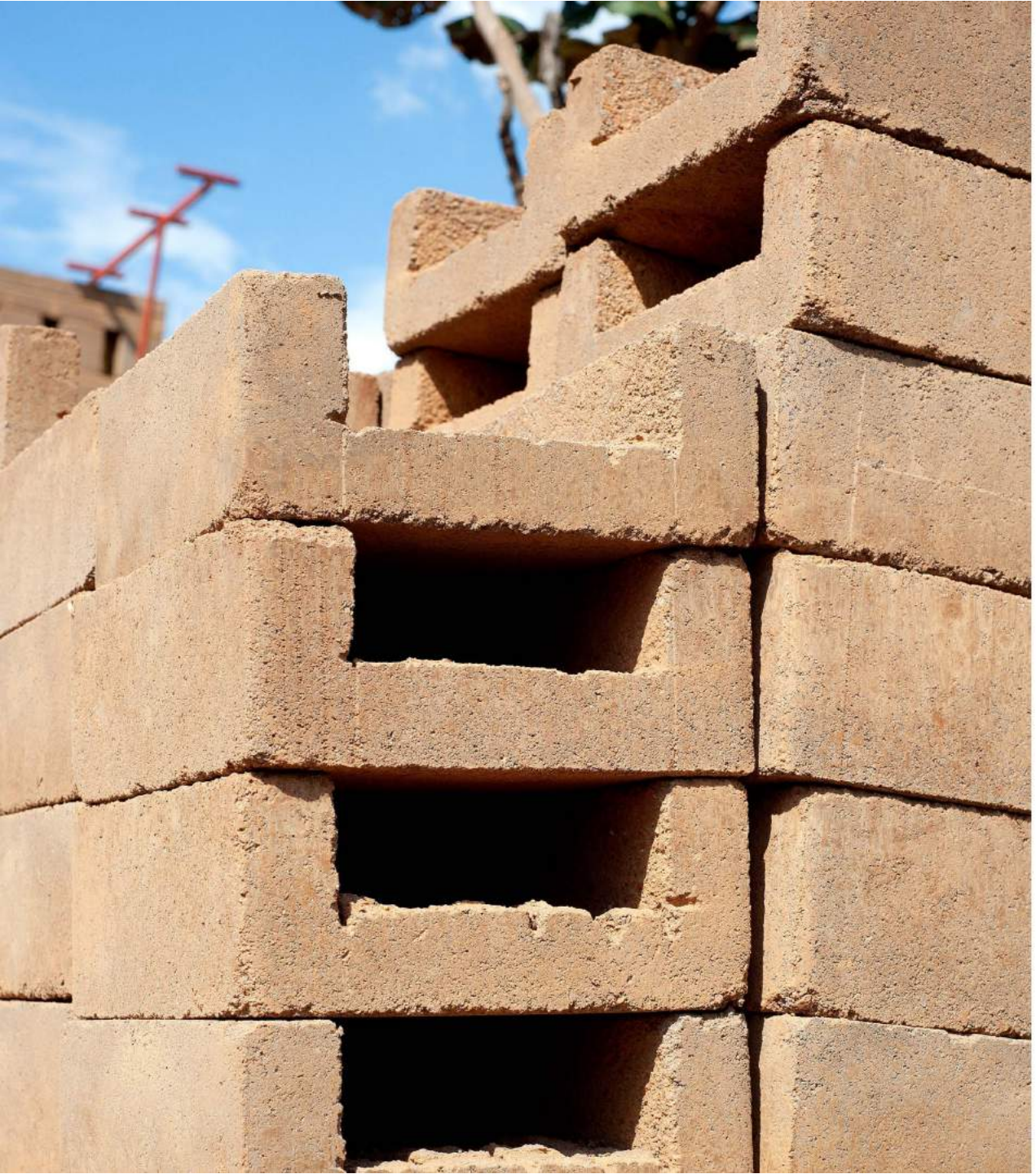
LOCAL MATERIALS

AWF CONSERVATION PRIMARY SCHOOLS

UGANDA

Studio FH


COMPRESSED STABILISED
EARTH BLOCKS (CSEB)
CEMENT : SAND : SOIL
1 : 4 : 8



3 GOOD HEALTH AND WELL-BEING

11 SUSTAINABLE CITIES AND COMMUNITIES

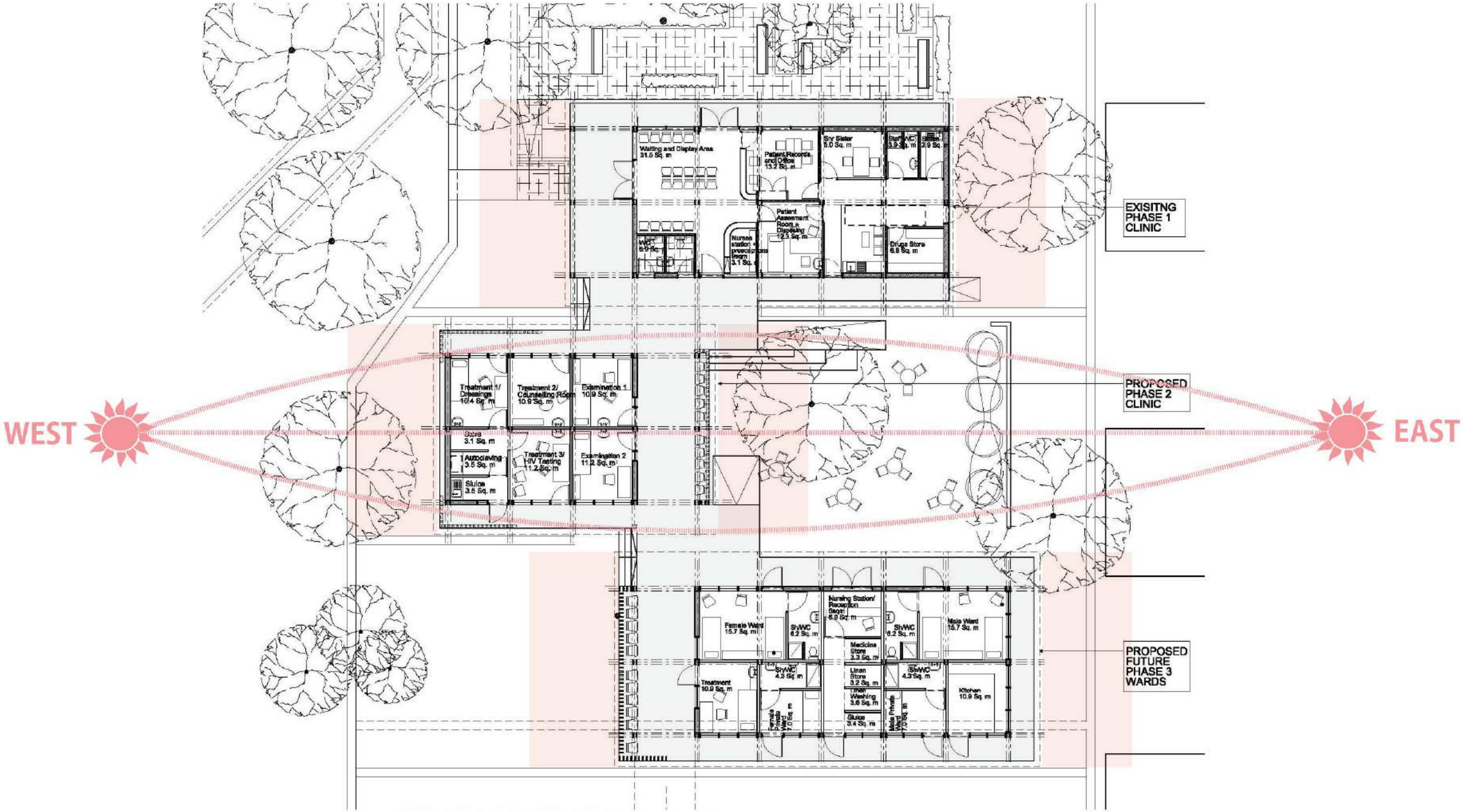
13 CLIMATE ACTION

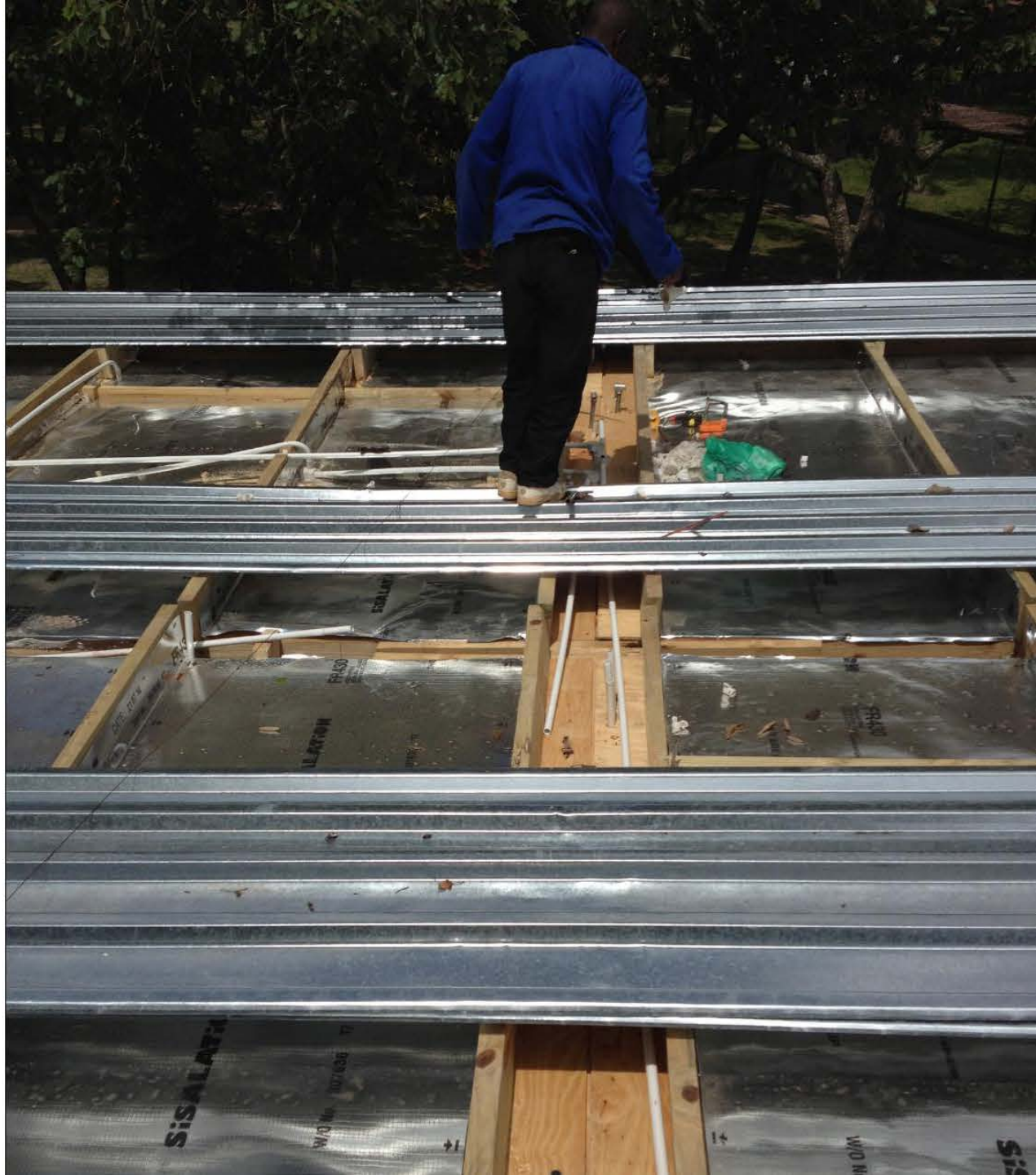
SOLAR SHADING

MZUZU HEALTH CENTRE

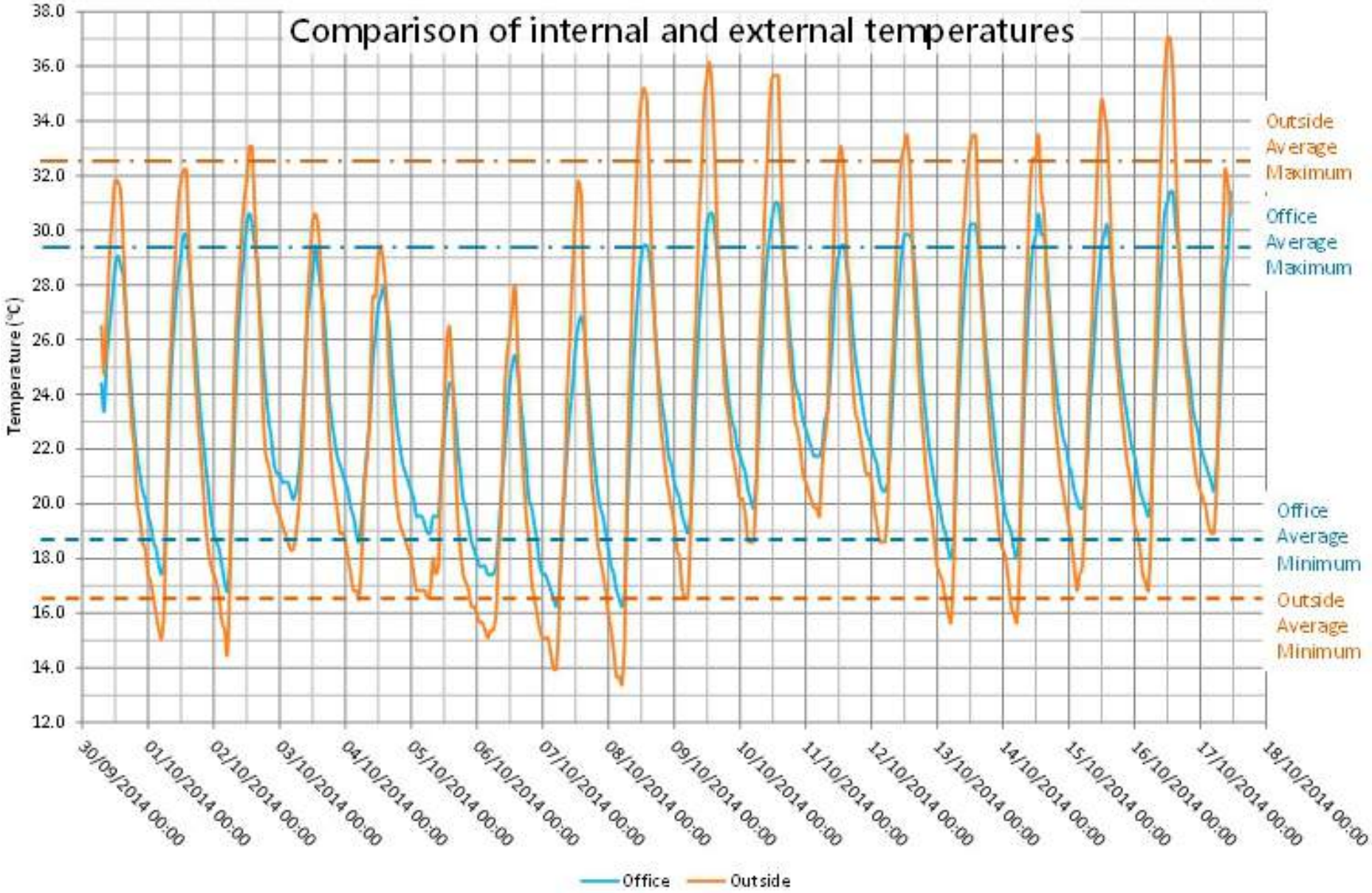
MALAWI

Feilden Foundation


WEST
EAST
EXISITNG PHASE 1 CLINIC
PROPOSED PHASE 2 CLINIC
PROPOSED FUTURE PHASE 3 WARDS
Waiting and Display Area 31.5 Sq. m
Patient Records and Office 13.2 Sq. m
Snr Sister 5.0 Sq. m
Staff WC 3.9 Sq. m
Shower 2.9 Sq. m
Patient Assesment Room & Dispensing 12.3 Sq. m
Nurses station + prescriptions room 3.1 Sq. m
WC 5.9 Sq. m
Drugs Store 6.8 Sq. m
Treatment 1/ Dressings 10.4 Sq. m
Treatment 2/ Counselling Room 10.9 Sq. m
Examination 1 10.9 Sq. m
Store 3.1 Sq. m
Autoclaving 3.5 Sq. m
Sluice 3.5 Sq. m
Treatment 3/ HIV Testing 11.2 Sq. m
Examination 2 11.2 Sq. m
Nursing Station/ Reception Desk 6.8 Sq. m
Female Ward 15.7 Sq. m
ShWC 6.2 Sq. m
ShWC 6.2 Sq. m
Male Ward 15.7 Sq. m
Medicine Store 3.3 Sq. m
Treatment 10.9 Sq. m
ShWC 4.3 Sq. m
Linen Store 3.2 Sq. m
ShWC 4.3 Sq. m
Linen Washing 3.6 Sq. m
Kitchen 10.9 Sq. m
Sluice 3.4 Sq. m
Female Private Ward 7.0 Sq. m
Male Private Ward 7.0 Sq. m


SISALATH


DATE: 21 07 14
DATE: 21/7/14


Comparison of internal and external temperatures
Temperature (°C)
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
Outside Average Maximum
Office Average Maximum
Office Average Minimum
Outside Average Minimum
30/09/2014 00:00
01/10/2014 00:00
02/10/2014 00:00
03/10/2014 00:00
04/10/2014 00:00
05/10/2014 00:00
06/10/2014 00:00
07/10/2014 00:00
08/10/2014 00:00
09/10/2014 00:00
10/10/2014 00:00
11/10/2014 00:00
12/10/2014 00:00
13/10/2014 00:00
14/10/2014 00:00
15/10/2014 00:00
16/10/2014 00:00
17/10/2014 00:00
18/10/2014 00:00
Office
Outside

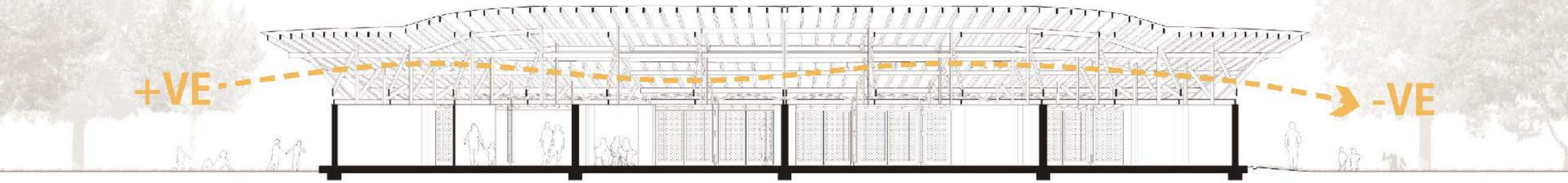

Tinytag
Temperature
Range H
-30°C→+50°C (-22°F→+122°F)
Transit
400
400

ILIMA PRIMARY SCHOOL

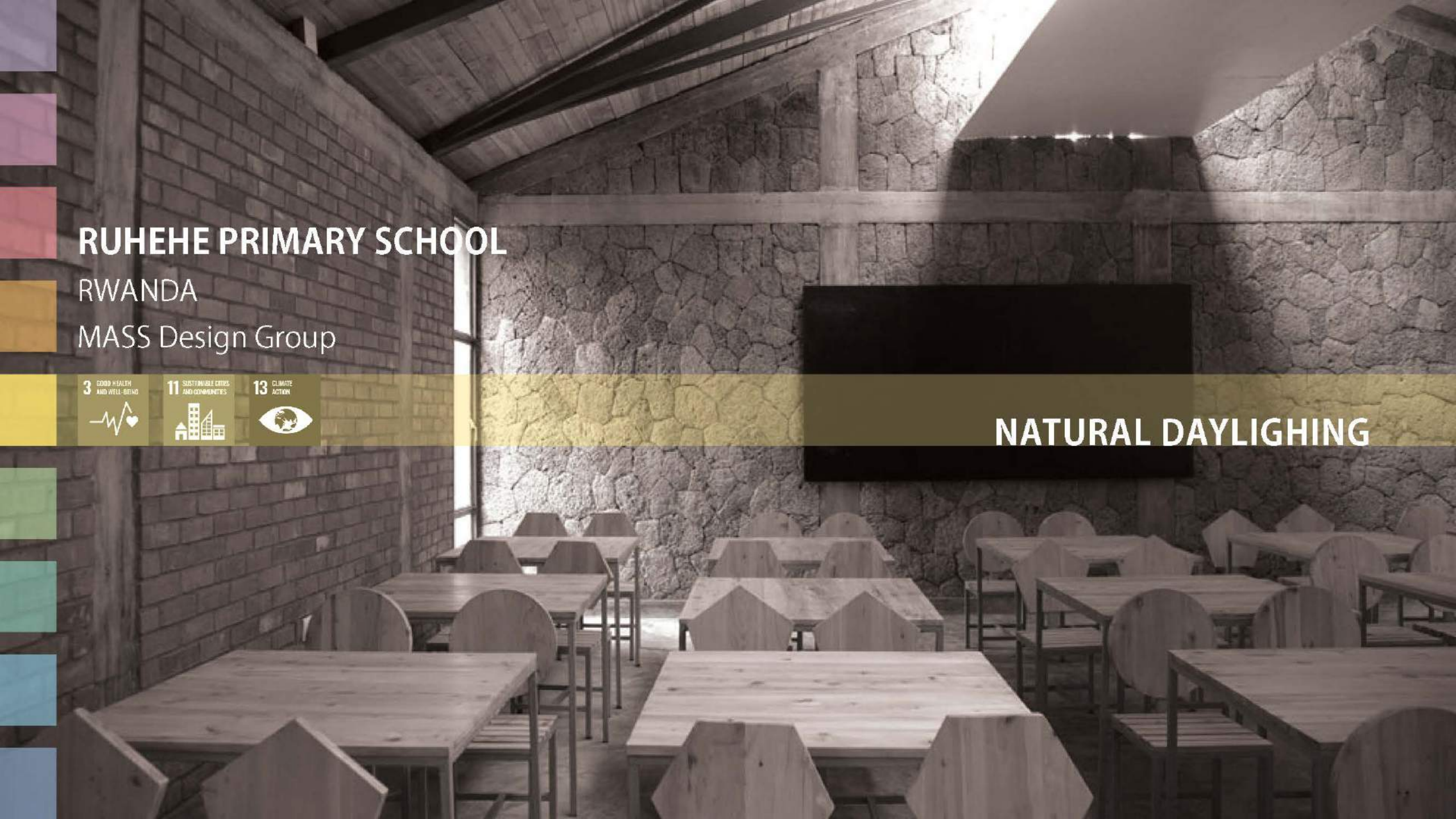
DEMOCRATIC REPUBLIC OF CONGO

MASS Design Group

PASSIVE VENTILATION


+VE
-VE


HOT
HOT
COOL
WARM



RUHEHE PRIMARY SCHOOL

RWANDA

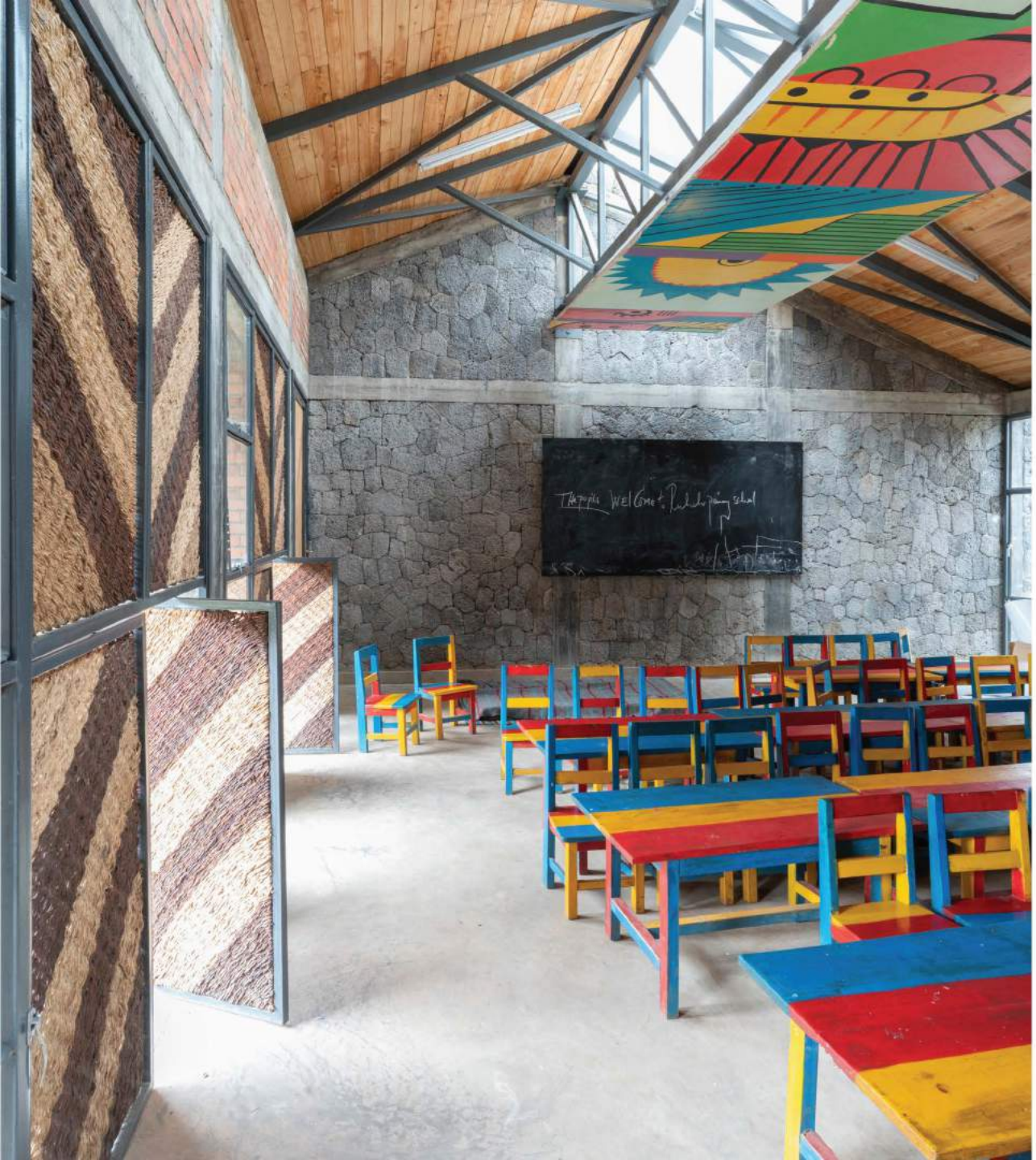
MASS Design Group

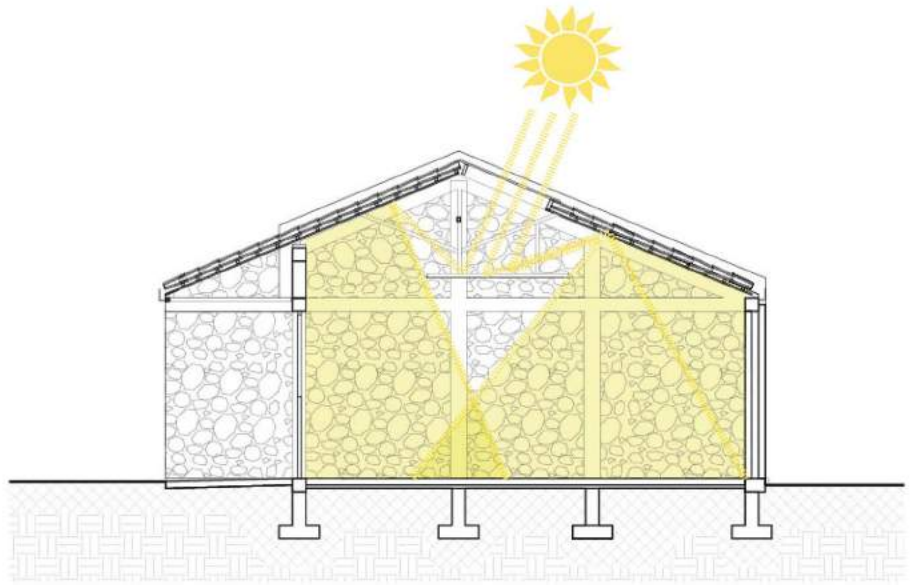
3 GOOD HEALTH AND WELL-BEING

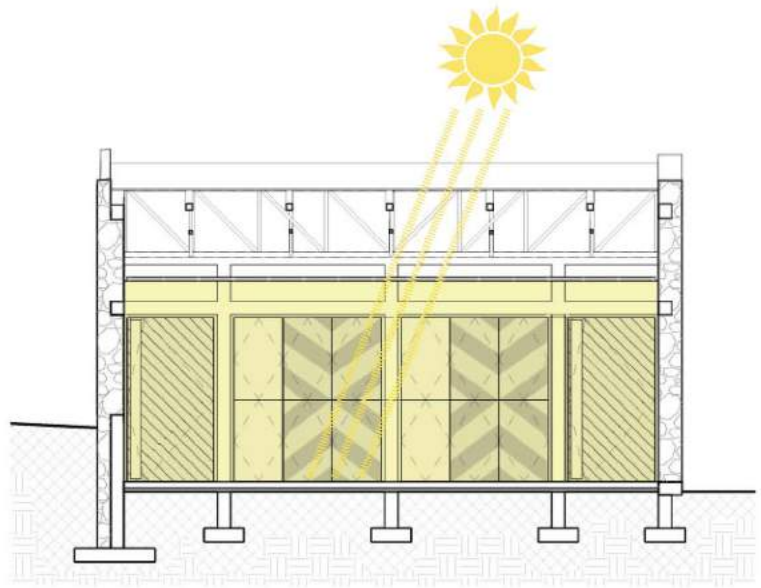
11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

NATURAL DAYLIGHING



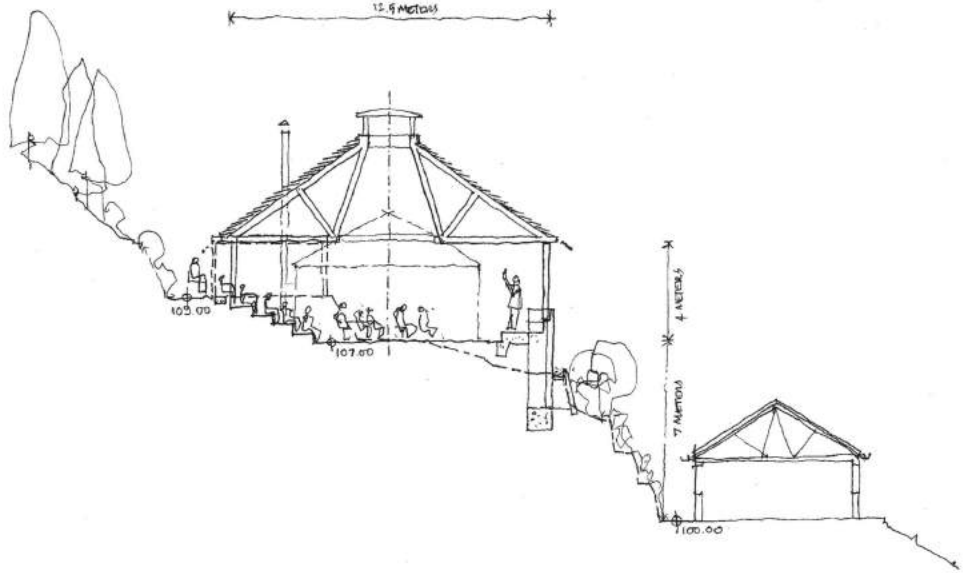


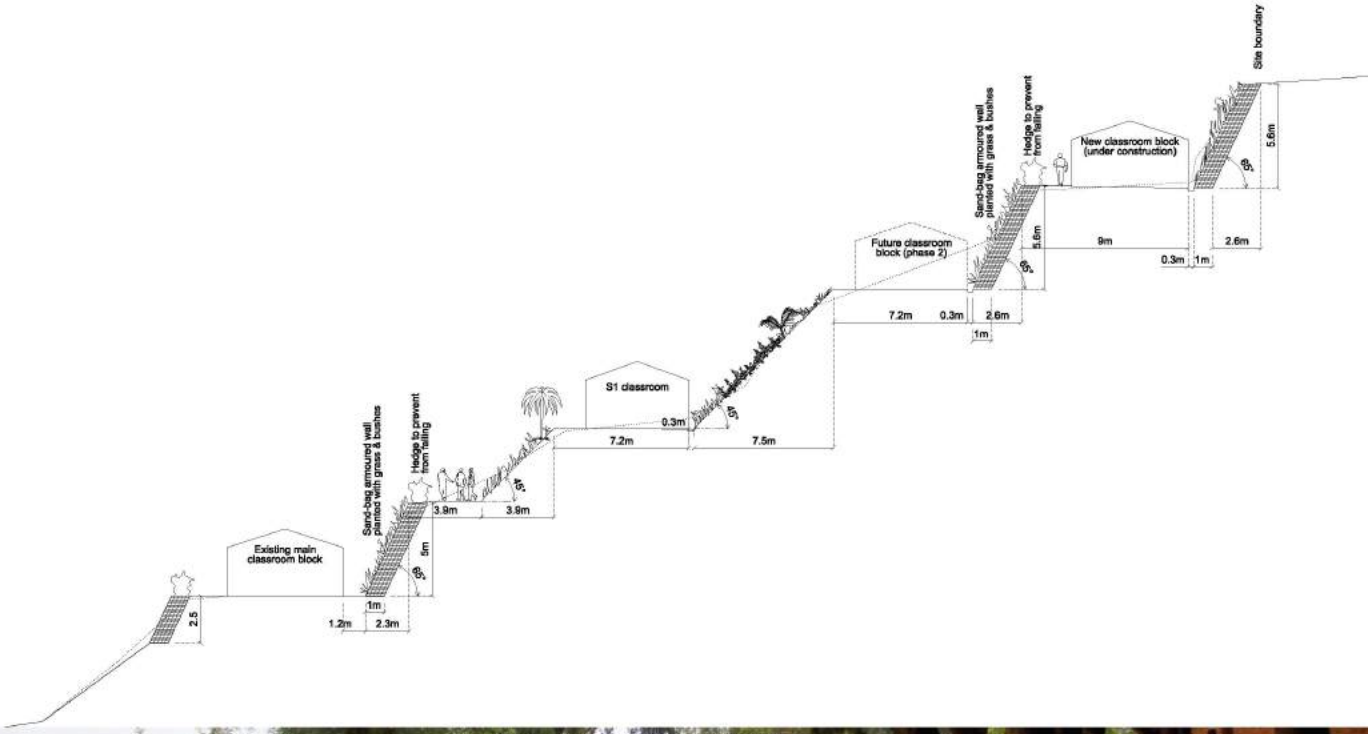


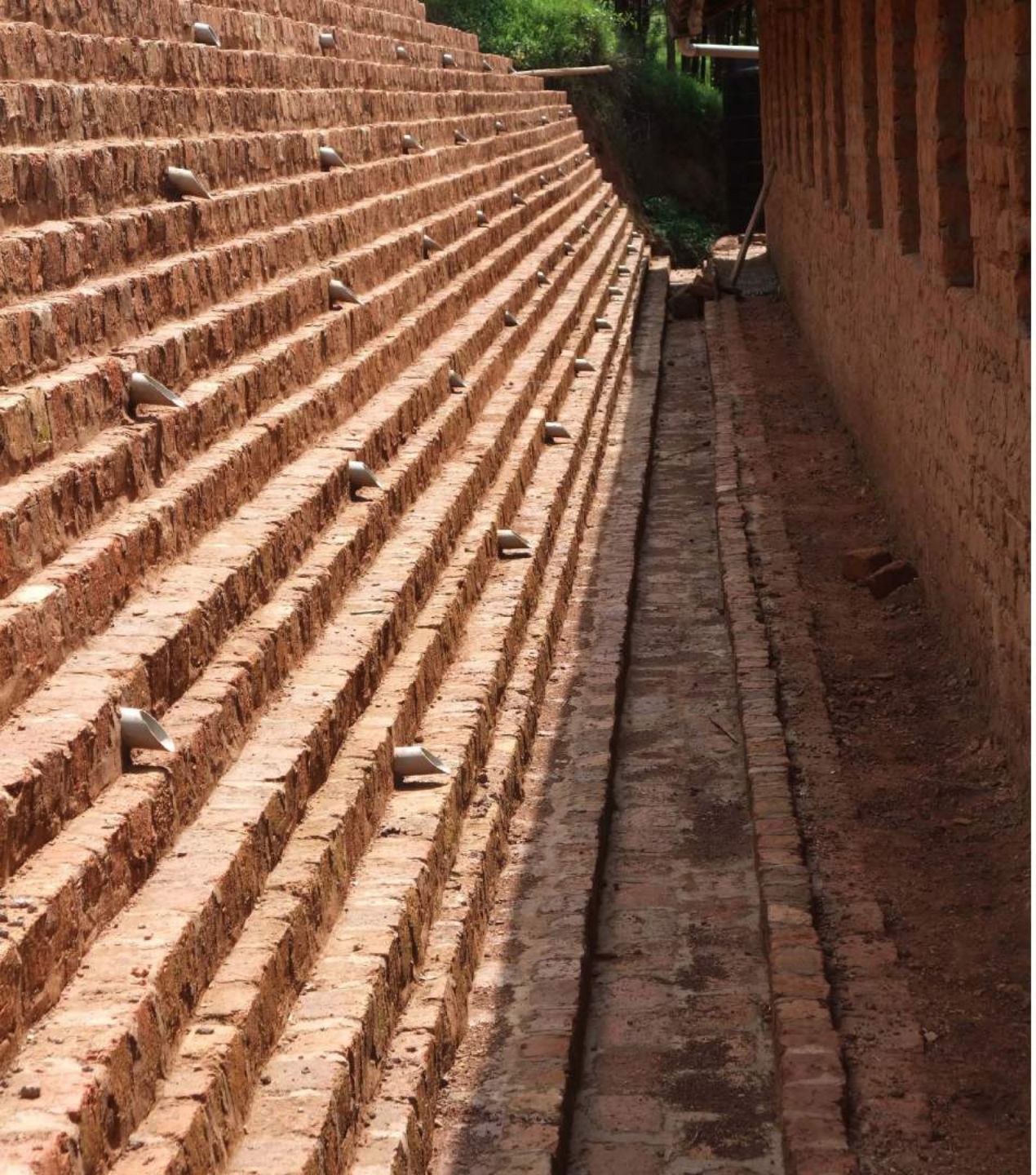
SUSTAINABLE LANDSCAPE LAKE BUNYONI VOCATIONAL SECONDARY SCHOOL

UGANDA

Feilden Foundation


12.5 METRES
105.00
107.00
7 METRES
100.00


Existing main classroom block
Sand-bag armoured wall planted with grass & bushes
Hedge to prevent from falling
S1 classroom
Future classroom block (phase 2)
New classroom block (under construction)
Site boundary
2.5
1m
1.2m
2.3m
3.9m
3.8m
5m
45°
0.3m
7.2m
7.5m
5.6m
9m
2.6m
1m

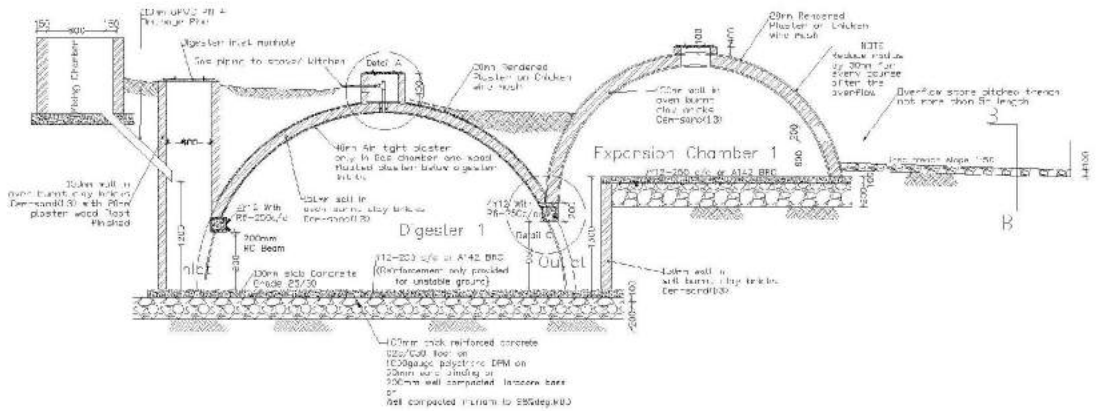


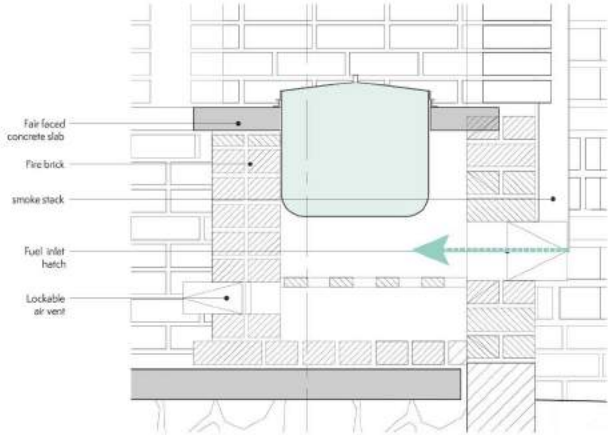

God is good
LIKE FOOT BALL

ENERGY GENERATION COF PRIMARY SCHOOLS

UGANDA

Studio FH


Expansion Chamber 1
Digester 1
Outlet
Inlet
B

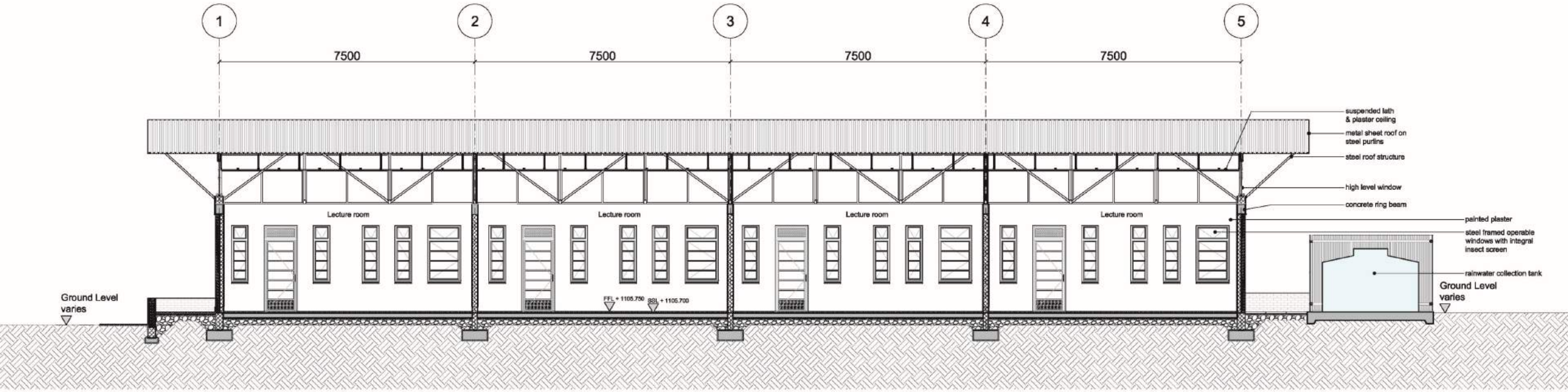

Fair faced concrete slab
Fire brick
smoke stack
Fuel inlet hatch
Lockable air vent

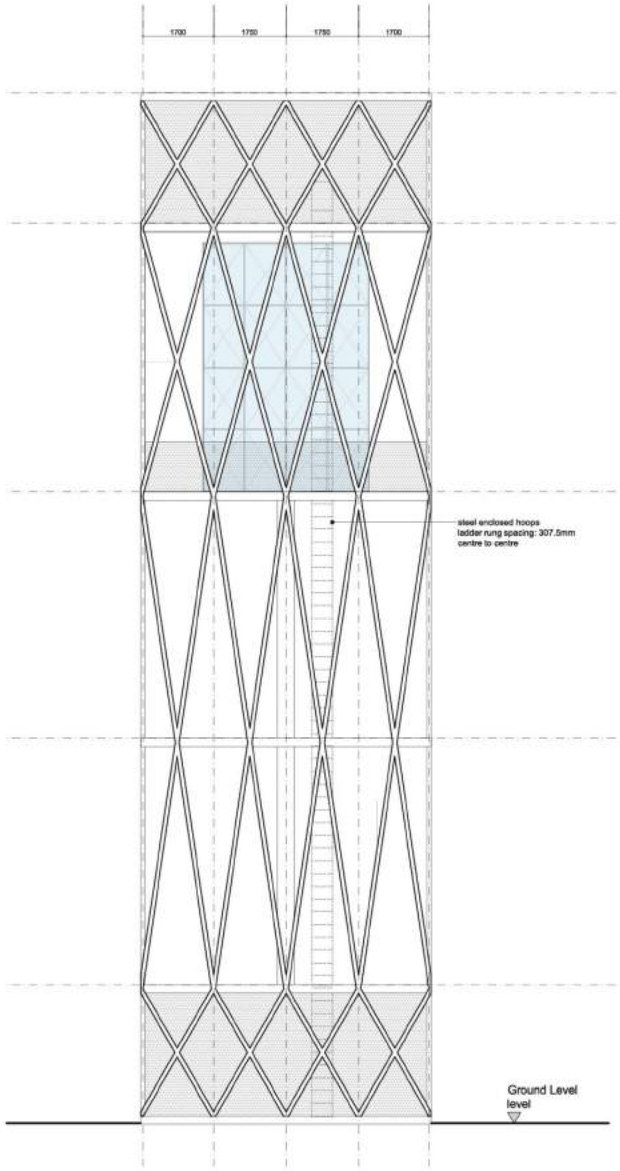
NATIONAL TEACHERS' TRAINING COLLEGE, KALIRO

UGANDA

FBW Group

WATER MANAGEMENT


1
2
3
4
5
7500
7500
7500
7500
Lecture room
Lecture room
Lecture room
Lecture room
FFL + 1105.750
SSL + 1105.700
Ground Level
varies
Ground Level
varies
suspended lath
& plaster ceiling
metal sheet roof on
steel purlins
steel roof structure
high level window
concrete ring beam
painted plaster
steel framed operable
windows with integral
insect screen
rainwater collection tank


1700
1750
1750
1700
steel enclosed hoops
ladder rung spacing: 307.5mm
centre to centre
Ground Level
level

EARLY CHILDHOOD DEVELOPMENT & FAMILY CENTRES

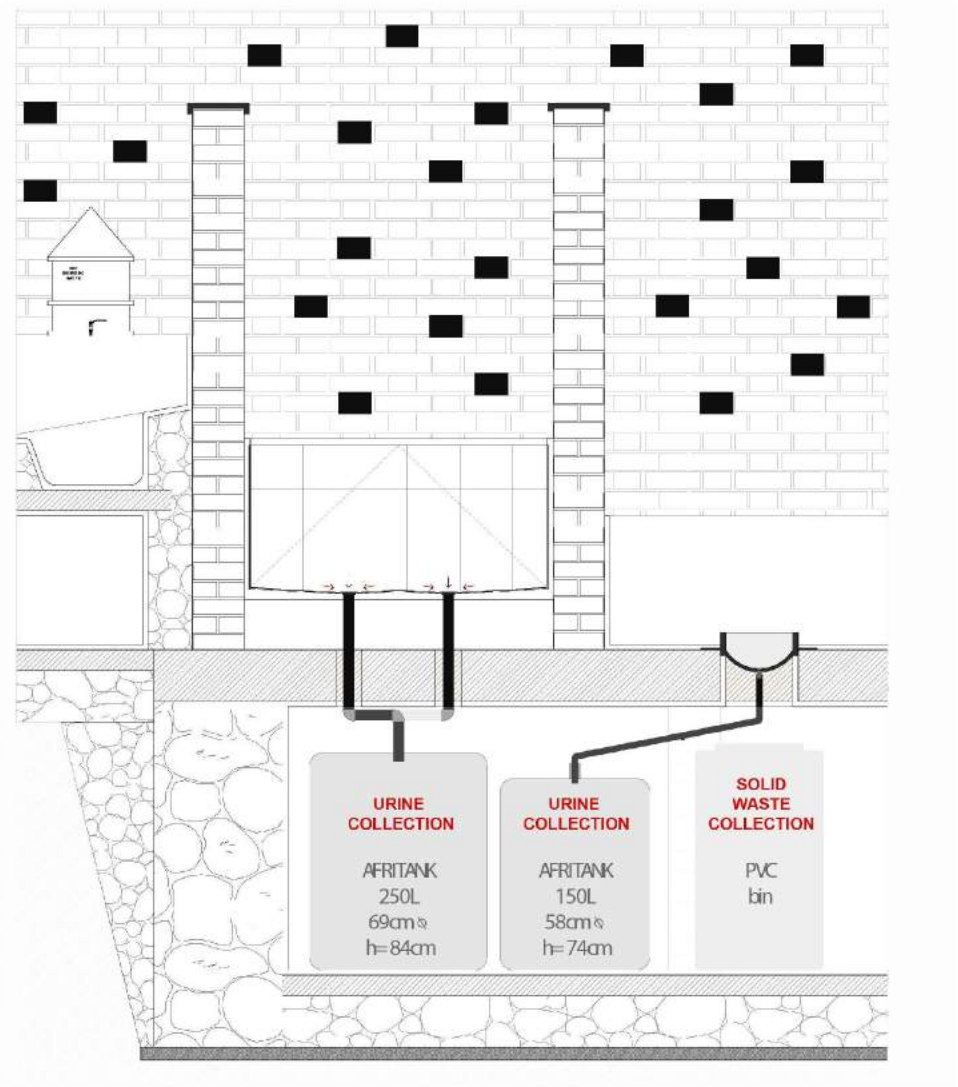
RWANDA

ASA Studio

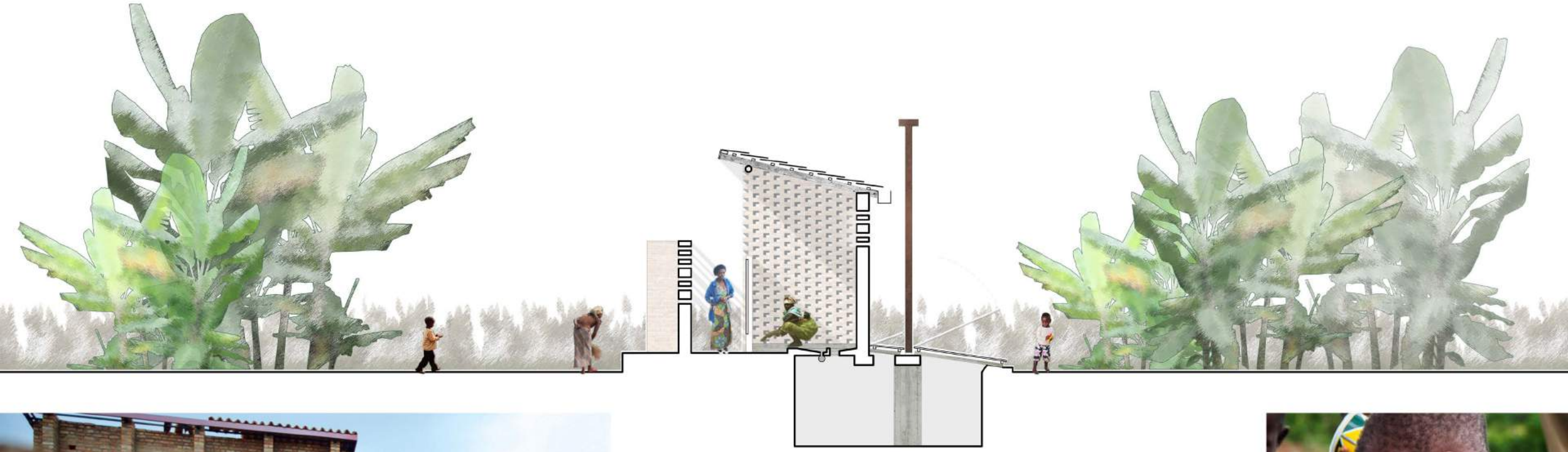
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
6 CLEAN WATER AND SANITATION
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION

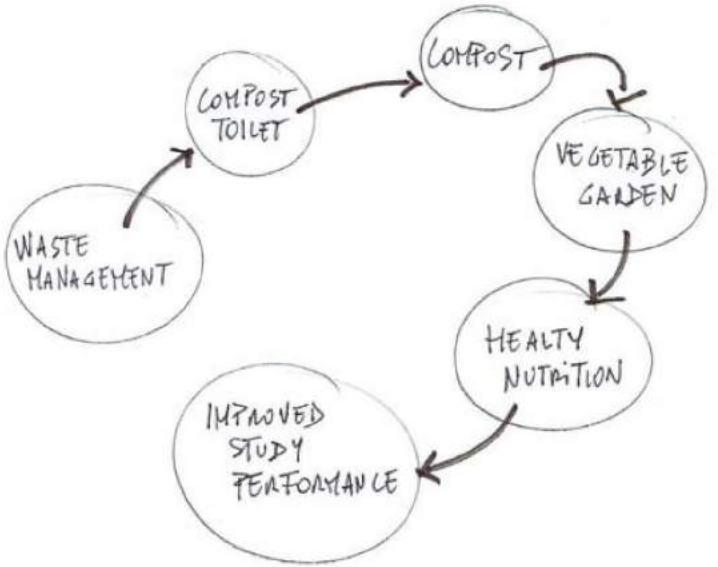
WASTE MANAGEMENT


AYA MAZI NTANYOBO
NO DRIKING WATE
AYA MAZI NTANY
NO DRIKING WA
AYA MAZI NTANY
NO DRIKING WA


URINE COLLECTION
AFRITANK
250L
69cm ⌀
h=84cm
URINE COLLECTION
AFRITANK
150L
58cm ⌀
h=74cm
SOLID WASTE COLLECTION
PVC
bin


UMWOBO 1UKOKESHWA AME
UNDI UFUNGWA AMEZI 6
USE 1PIT 6 MONTHS
CLOSE OTHER 6MONTHS




COMPOST TOILET
COMPOST
VEGETABLE GARDEN
HEALTY NUTRITION
IMPROVED STUDY PERFORMANCE
WASTE MANAGEMENT


SEEDS

THE MANIFESTO

THE MANIFESTO

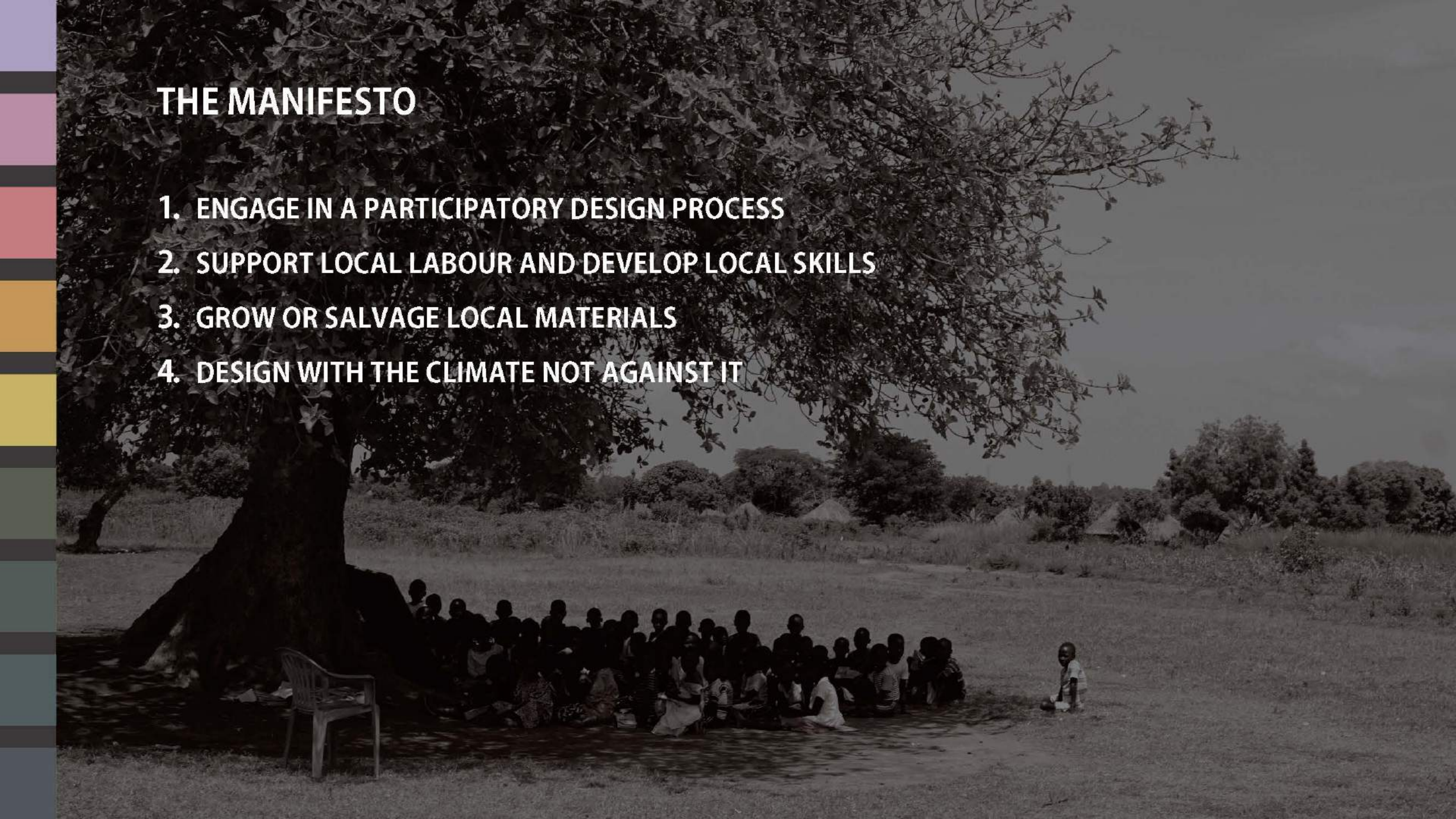
1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS

THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
2. SUPPORT LOCAL LABOUR AND DEVELOP LOCAL SKILLS

THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
2. SUPPORT LOCAL LABOUR AND DEVELOP LOCAL SKILLS
3. GROW OR SALVAGE LOCAL MATERIALS



THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
2. SUPPORT LOCAL LABOUR AND DEVELOP LOCAL SKILLS
3. GROW OR SALVAGE LOCAL MATERIALS
4. DESIGN WITH THE CLIMATE NOT AGAINST IT

THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
2. SUPPORT LOCAL LABOUR AND DEVELOP LOCAL SKILLS
3. GROW OR SALVAGE LOCAL MATERIALS
4. DESIGN WITH THE CLIMATE NOT AGAINST IT
5. NURTURE THE LOCAL ECOSYSTEM

THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
2. SUPPORT LOCAL LABOUR AND DEVELOP LOCAL SKILLS
3. GROW OR SALVAGE LOCAL MATERIALS
4. DESIGN WITH THE CLIMATE NOT AGAINST IT
5. NURTURE THE LOCAL ECOSYSTEM
6. PRODUCE CLEAN ON-SITE ENERGY

THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
2. SUPPORT LOCAL LABOUR AND DEVELOP LOCAL SKILLS
3. GROW OR SALVAGE LOCAL MATERIALS
4. DESIGN WITH THE CLIMATE NOT AGAINST IT
5. NURTURE THE LOCAL ECOSYSTEM
6. PRODUCE CLEAN ON-SITE ENERGY
7. UTILISE SUSTAINABLE WATER SOURCES

THE MANIFESTO

1. ENGAGE IN A PARTICIPATORY DESIGN PROCESS
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5. NURTURE THE LOCAL ECOSYSTEM
6. PRODUCE CLEAN ON-SITE ENERGY
7. UTILISE SUSTAINABLE WATER SOURCES
8. PROVIDE WATER, SANITATION AND HYGIENE FACILITIES

THE MANIFESTO

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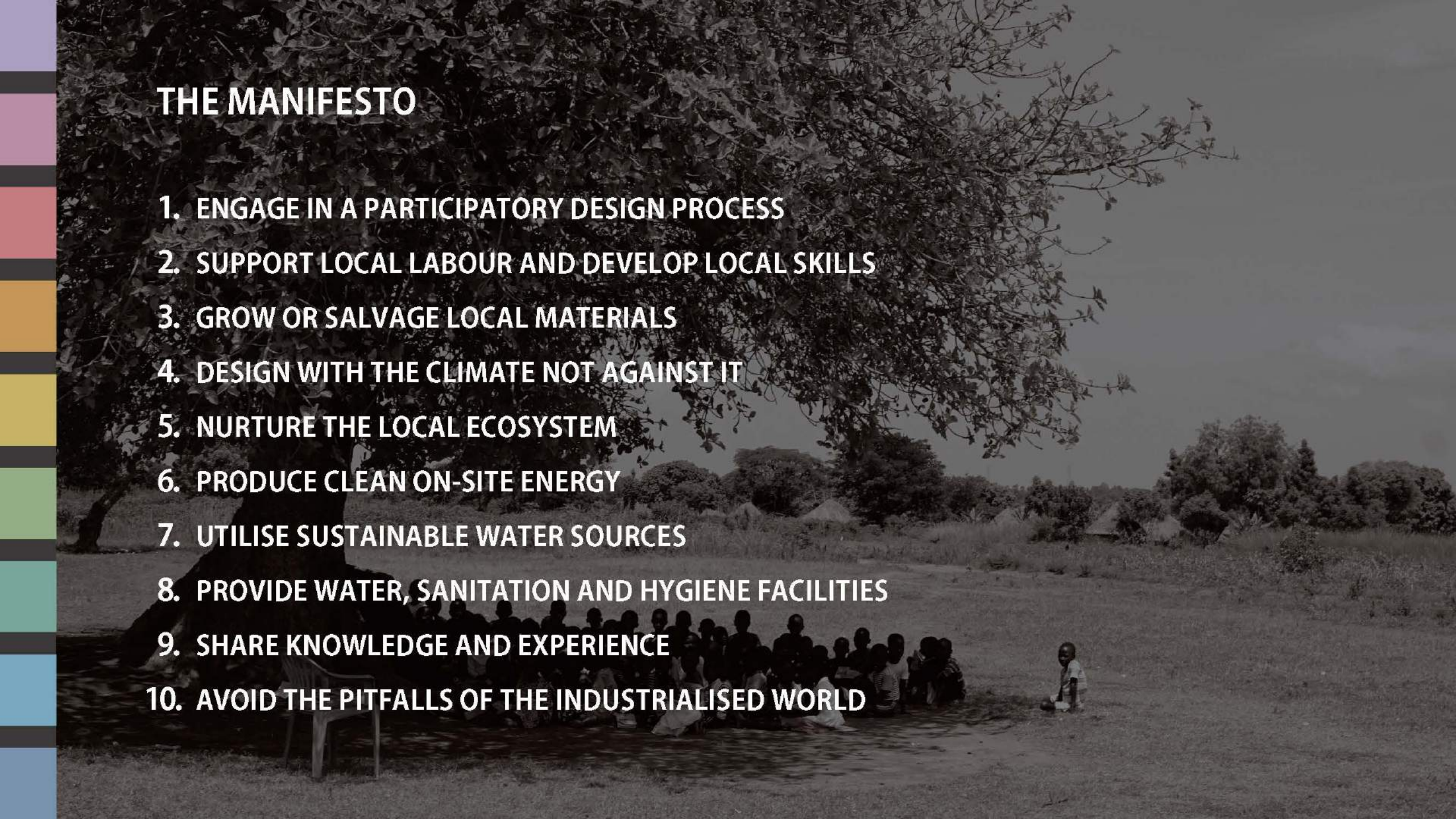
6. PRODUCE CLEAN ON-SITE ENERGY
7. UTILISE SUSTAINABLE WATER SOURCES
8. PROVIDE WATER, SANITATION AND HYGIENE FACILITIES
9. SHARE KNOWLEDGE AND EXPERIENCE



THE MANIFESTO

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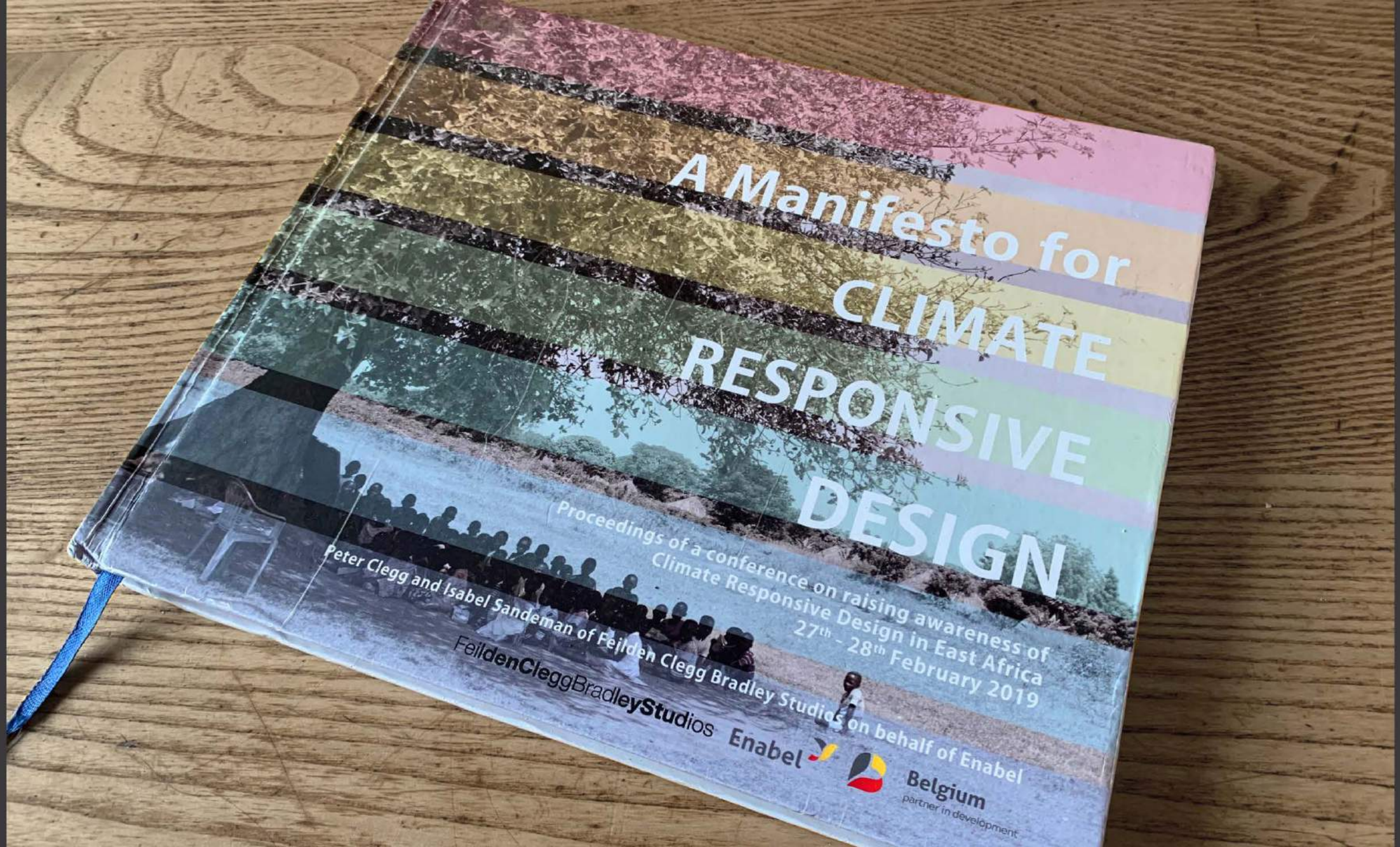
8. PROVIDE WATER, SANITATION AND HYGIENE FACILITIES
9. SHARE KNOWLEDGE AND EXPERIENCE
10. AVOID THE PITFALLS OF THE INDUSTRIALISED WORLD


A Manifesto for
CLIMATE
RESPONSIVE
DESIGN
Proceedings of a conference on raising awareness of
Climate Responsive Design in East Africa
27th - 28th February 2019
Peter Clegg and Isabel Sandeman of Feilden Clegg Bradley Studios on behalf of Enabel
FeildenCleggBradleyStudios
Enabel
Belgium
partner in development

RWAMAGANA LEADERS' SCHOOL DORMITORY

Rwamagana Leaders' School is a secondary boarding school in eastern Rwanda with a curriculum that focuses on sustainability. The new dormitory building, designed by ASA Studio, [illegible] the potential of empowerment in education through architecture. The building acts as a teaching tool that enhances the boarding school experience while [illegible] the students and offering a safe and healthy environment. The result is an innovative and socially responsive solution that balances sustainability, cost effectiveness and functionality.

The adoption of a participatory design approach played a significant role in the positive outcome of the project, integrating the students' inputs for a better understanding of the space. Thanks to step-by-step construction training, mock-ups, and on-site material testing, the workers learned how to improve their traditional construction techniques and adopt alternative locally available and affordable materials, such as clay, stones, lime and reeds. Simple passive design principles have been employed to ensure adequate daylighting and natural ventilation, which are fundamental to the interior comfort of students, enhancing their quality of life and study performance.

Location Rwamagana District, Rwanda
Architect ASA Studio
Client Rwamagana Leaders' School
Consultant –
Size [illegible]
Cost [illegible]
Year [illegible]

SUSTAINABLE MATERIALS

EARTHEN FLOOR

[illegible]

FIRED BRICK WALLS

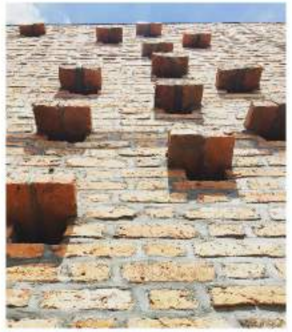
[illegible]

BAMBOO SCREENING

[illegible]

RIVER CANE CEILING

[illegible]



PASSIVE VENTILATION

OPENINGS

[illegible]

CROSS VENTILATION

[illegible]

NATURAL DAYLIGHT

EVEN DISTRIBUTION

[illegible]

ILIMA PRIMARY SCHOOL

In 2012, MASS Design Group and the African Wildlife Foundation (AWF) partnered to [illegible] the Classroom Africa initiative, a network of conservation schools throughout Africa engineered to mitigate conflicts between people and wildlife and bolster environmental stewardship. The Ilima Primary School was the first school created by this collaboration.

Ilima is located deep in the jungle of the Congo Basin, six hours by motorcycle from the nearest airstrip. The school serves as a community centre for village-level programming to promote sustainable farming and hunting practices for the mutually beneficial integration of villagers and wildlife. With its innovative design, it is the largest and most complex structure many of the villagers have ever seen. The redesigned classrooms, with capacity of 350, replacing an old lean-to on the site with room for 90, shelter students from the elements and [illegible] focus and curiosity, leading to higher student attendance and retention rates. Ilima Primary School is a building with virtually zero embodied energy, designed for extreme sustainability, redefining what architecture can aspire to in limited-resource areas.

Location Ilima, DRC
Architect MASS Design Group
Client African Wildlife Foundation
Consultant Arup Engineers
Size 800sqm (building) / 1100sqm (plot)
Year 2015

SUSTAINABLE MATERIALS

[illegible]

MUD BRICK

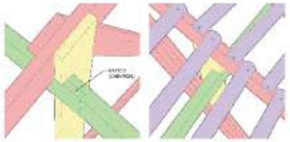
[illegible]

HARDWOOD ROOF STRUCTURE

[illegible]

HARDWOOD SHINGLES

[illegible]



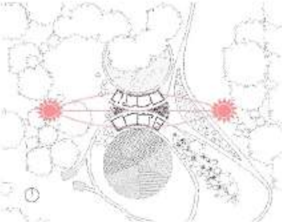
SOLAR SHADING

ORIENTATION

[illegible]

OVERHANGS

[illegible]



PASSIVE VENTILATION

CROSS/STACK VENTILATION

[illegible]

OPENINGS

[illegible]

CLIMATE RESPONSIVE DESIGN

EAST AFRICA

Enabel

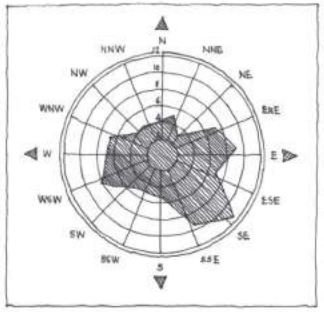
Belgium
partner in development

PASSIVE VENTILATION

Ventilation is needed in all buildings to remove odours and provide us with oxygen. In hot climates, like East Africa, adequate ventilation is essential to provide cooling. 'Passive' ventilation through windows and opening vents is the cheapest and simplest form of providing fresh air. Where there are problems with ambient noise or pollution, often in more urban locations, mechanical ventilation can be necessary, but passive ventilation should always be the default solution.

PREVAILING WIND

Check wind speed and direction during the hottest season and design to capture prevailing winds.



Air movement can have a cooling effect when temperatures are uncomfortably high. Air movement of around three meters per second can provide an apparent cooling effect equivalent to around 2°C. The prevailing wind tends to come from east through to west with a predominance of wind from the south east during the hottest season but there are inevitably significant regional and local variations caused by topography, trees or nearby buildings. Learning from locals, and if possible, installing a weather station during the early project stages can help to identify local wind conditions relevant for building orientation.

CASE STUDIES

National Teachers' College Kaliro

More Case Studies to be added...


K P S
A P S


FeildenCleggBradleyStudios

FeildenCleggBradleyStudios

Commonwealth Association of Architects

Engaging with the UN 2030 Sustainable Development Goals

We hope you found this lecture of interest and that you will be interested in the other lectures in this series:

1. **Introduction to the UN 2030 Sustainable Development Goals**
2. **Planning for Rapid Urbanisation**
3. **Planned City Extensions**
4. **Resilient Infrastructure**
5. **Climate Responsive Design**
6. **Heritage-led Regeneration**
7. **Sustainable Outcomes Guide**

The Commonwealth Association of Architects would like to extend its thanks to all the contributors for their support in the creation of this pilot programme. The CAA welcomes feedback together with suggestions for future topics and would be pleased to hear from subject matter experts from around the Commonwealth who may be interested in contributing future material.

For this or any other issue, please contact: admin@comarchitect.org

@comarchitect
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admin@comarchitect.org

www.commonwealthsustainablecities.org/cpd