Circular Refugee Camps

Co-creating meaningful business

L.L. de Rooij, M. Stuiver

WAGENINGEN
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This research is part of the programme *Circular and climate neutral society* of Wageningen University & Research and was funded by the Dutch Ministry of Agriculture, Nature and Food Quality (project number KB-34-015-003).

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Het rapport *'Circular Refugee Camps'* geeft inzicht in het creatieve proces dat Wageningen University & Research samen met partners in 2019 heeft doorlopen om tot nieuwe strategische samenwerkingen en potentiele businesscases te komen om circulaire oplossingen aan te passen, te verbinden en aan te jagen om de leefomstandigheden en mogelijkheden in en rondom vluchtelingenkampen te verbeteren. Het doel is om gezamenlijk integrale oplossingen te ontwikkelen die zijn aangepast aan de specifieke context en voortbouwen op een zeer participatieve aanpak samen met Nederlandse en lokale belanghebbenden, ondersteund door een programmatische aanpak en kennisagenda.

The report *'Circular Refugee Camps'* provides insight in the creative process which Wageningen University & Research together with its partners has gone through to develop new strategic cooperation and potential business cases to adapt, connect and boost circular solutions to improve living conditions and livelihood opportunities in and around refugee camps. The aim is to develop integrative solutions tailored to the specific context and builds upon a highly participatory approach together with Dutch and local stakeholders, supported by a programmatic approach and knowledge agenda.

Keywords: migration, refugee camps, circular solutions, migrant cities, nature based solutions

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Photo cover: Kyangwali Refugee camp Uganda (credit: Bertram de Rooij)

Contents

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Wageningen Environmental Research (WENR) values the quality of our end products greatly. A review of the reports on scientific quality by a reviewer is a standard part of our quality policy.

Approved reviewer who stated the appraisal,

position: Program leader Circular and climate neutral society

name: Saskia Visser

date: 24 January 2020

Approved team leader responsible for the contents,

name: Corine van As

date: 6 March 2020

Selling charcoal in Kiryandongo -Uganda
(Photo credit: Bertram de Rooij)

Summary

Around the world numerous refugee camps and 'migrant cities' host vast numbers of displaced persons. These camps and urban areas are often highly challenged. Facing limited facilities, limited resources and not seldom harsh environmental conditions, not only for the displaced community but also for their host community. Refugee camps and large influxes of migrants bring along enormous pressures on the available natural resources in a specific area. This often leads to stress and conflict between the host community and the new settlers. Circular concepts as a broad concept, seem promising to provide an outcome to reduce stress in an existing situation and avoid stress by the development of future (new) refugee camps and their host community.

This report provides insight in the creative process which Wageningen University & Research together with its partners has gone through to develop new strategic cooperation and potential business cases to adapt, connect and boost circular solutions to improve living conditions and livelihood opportunities in and around refugee camps. The aim is to develop integrative solutions tailored to the specific context and builds upon a highly participatory approach together with Dutch and local stakeholders, supported by a programmatic approach and knowledge agenda.

By three consecutive interactive workshops with the multi-disciplinary core team and supportive work from five consortia, the factsheets and Knowledge Agenda have been built based on actual knowledge questions to support initiatives. Besides communication and outreach for further discussion and research steps are been performed.

The research activities in 2019 have paved the way forward to actual concrete concepts and steps towards circular solutions. During the Design Session, a preliminary pathway was presented towards actual implementation. Based on the outcomes each consortium could start the actual implementation on the pilot level by 2021, which should form a basis for further testing, assessing and scaling up. In the suggested work plan for 2020, the development and context-specific elaboration of the circular concepts will be focused.

Homestead in Kiryandongo -Uganda
(Photo credit: Bertram de Rooij)

1 Introduction

Around the world numerous refugee camps and 'migrant cities' host vast numbers of displaced persons. These camps and urban areas are often highly challenged. Facing limited facilities, limited resources and not seldom harsh environmental conditions, not only for the displaced community but also for their host community. Livelihood perspectives and living conditions are often poor and practice shows this leads to environmental degradation, depletion of resources and dependencies on ongoing aid support. Born from immediate relief and still seen as 'temporary' these areas come with little development perspective.

Nevertheless, there are many opportunities that could derive from a circular perspective and available knowledge, expertise and techniques. The success of this circular perspective and actual implementation highly depends on the proper understanding and connection with actual local needs, its context and accurate governance and implementation strategies. Linking themes and sectors, no single issues. Global challenges, Dutch Solutions. Wageningen University & Research sees the highly strategic and societal relevance of this topic and in 2019 a Strategic Investment Project (SIP) within the KB-program Circular and Climate neutral was granted to explore the opportunities and develop strategic partnerships. The results of this SIP are brought together in this report.

1.1 Scope

The objective of this project is to build and support potential business cases to **adapt, connect and boost circular solutions** to improve the living conditions and livelihood opportunities in refugee camps. The aim is to develop integrative solutions tailored to the specific context and needs, and builds upon a highly participatory approach together with Dutch and local stakeholders.

1.2 Methodology

The project activities of 2019 were dedicated to:

- Build strategic partnerships and network (task 1)
- Develop and support potential consortia/initiatives (task 2)
- Develop factsheets (task 3)
- Build Knowledge Agenda based on actual knowledge questions to support initiatives (task 4)
- Communication and outreach (task 5)

In the project activities a combination was made of active stakeholder consultation and participation, joint fact finding and supportive data analysis.

During the project a coordinating multi-disciplinary core team was formed and three consecutive interactive workshops were held. The workshops were carefully prepared, combining joint fact finding, co-creation and design methods. Besides, a format for factsheets at two scales (national and local) is developed and elaborated for three countries and refugee camps/settlements. Currently, five consortia are working on follow up steps, supported by the core team. Based on the actual knowledge demands of these consortia, combined with knowledge needs regarding overall strategy and methodology, the Knowledge Agenda has been developed.

Refugee settlement Kyangwali -Uganda
(Photo credit: Bertram de Rooij)

2 Building cooperation

In 2016 the report Sustainable Design Principles for Refugee Camps (KB-25-005-005) already explored and highlighted the potential and opportunities of a different view towards refugee camps and settlements for both refugee and hosting communities. The focus should shift towards an opportunistic, constructive and integrative approach, in which resource management and the environment should play a more prominent role. This paves the way towards more circular principles and solutions.

Inspired by this report and a shared view on opportunities, Wageningen University and Research and NL Works have joined forces to explore further actions, actively inspire and involve the business community and work towards actual implementation.

NLWorks is an initiative of the Dutch Ministries of Foreign Affairs, Ministry of Infrastructure and Water management, Economic Affairs and Climate policy and the Dutch business community (VNO-NCW and MKB-Nederland). This initiative has the ambition to initiate, create and realise multi-annual programs with impact on global societal challenges, based on public-private cooperation and Dutch innovative power. Their mission is to stimulate cooperation of business community, (non)governmental organisations and knowledge institutes in these programs toward concrete bankable and scalable solutions.

This has led to a solid core team, an extending partnership network and several consecutive workshops towards actual programming and projects.

2.1 Exploratory session

On June 21, 2019 -the day after World Refugee Day- NL Works and Wageningen University organised the first exploratory session. The objective of this exploratory session was to explore jointly the opportunities and conditions to develop a program on (inclusive) circular refugee camps and settlements.

The Netherlands has ample knowledge and technology that can be applied to improve and sustain the living conditions in refugee camps (agro-food, modular/circular construction, drinking water facilities, sanitation, waste water treatment, reuse of materials, sustainable energy, health). The ambition was set out to build one (or more) programs together as input for local needs connected to integrated, inclusive, circular and scalable solutions for the improvement of living conditions in refugee camps. This was combined with the strong belief that more and better impact will be generated by bringing in integrated and scalable Dutch innovative knowledge and technology.

From existing networks, like the Changing Routes initiative (WUR, 2017), targeted invitations were sent to have a dedicated expert group with good overview on the topic, opportunities and possible constraints. The exploratory session seemed to have been set at the proper time. Shortly before the session a Dutch delegation of government, knowledge institutes and business had a mission towards the UNHCR in Denmark. The following organisations participated in this first exploratory session: NL Works, Wageningen University & Research, VNG International, Netherlands Enterprise Agency (RVO), Red Cross, Deltares, PLAN modules ad Outside Inc. Other organisations interested and involved in follow up actions, but could not participate in this particular session, were ReliefBase and Clingendael Institute.

The main conclusions of this first preparatory meeting were:

- There is clearly interest in building a program on circular refugee camps and settlements
- Inclusion of refugees and circularity in existing urban areas could also be a separate topic

- The topic is very delicate and good governance is important
- The organisation and management of refugee camps and settlement and implementation of new concepts is very complex. This needs full support and coordination of governmental and non-governmental organisations.

- Attention is needed for future procurement and commissioning (i.e. required certification, risk management, program financing of project financing)

- Local needs and local ownership should be at the very basis
- Full understanding of the local situation, needs and challenges should be the starting point, towards tailored circular concepts
- Combining short-term sustainable aid perspectives and development perspectives
- Refugee population and host communities should both benefit
- Clear arrangements should be made how to best organise and align the circular perspective in projects and program management

- Set the ambition for a broader Design session/Co-creation workshop during Dutch Design Week 2019. NL Works, Spindle, WUR and Outside Inc will take the organisational lead for this workshop and preparatory analysis (factsheets).






Photos *Impression first work session (June 2019)*

2.2 Design session

On October 21st 2019, a side event was organized at the Dutch Design Week in Eindhoven.
The main goal of this event was to bring together Dutch (circular) business initiatives and refugee camp experts to drive circular business opportunities around refugee camps.

In a carefully programmed Design session the participants jointly explored new (commercial & impactful) business opportunities: opportunities to test and validate products/services for challenges around refugee camps, possibilities to replicate products/services for new impact in and around refugee camps, but most of all opportunities to meet each other in action and build an impactful consortium.

At the very basis of this, insights and experiences were shared to inspire each other and form a common understanding of the actual needs, possibilities and opportunities.

Goal of the day:
- *Get a better understanding of the circular challenges and opportunities around refugee camps*
- *Find partners to join forces and define collaborate circular opportunities*
- *Start co-creating consortia and innovative circular concepts and solutions*

As a kick-off a panel interview and discussion was held, based on stories from the field. Panellists were Sandra Cats (Red Cross), Joost de Waard (entrepreneur Village Pump), Nasrat Popal (Netherlands Enterprise Agency and experience expert). Together they give good insights in the actual demands, needs and constraints in the daily life and management in and around refugee camps.

Photo *Explaining next steps and horizon at plenary session Dutch Design Week (October 2019)*

After this plenary start a deep dive carrousel followed. The participants rotated in three groups along three preselected countries: Uganda, Kenya and Jordan. For each country a factsheet was prepared and available. Three key country experts (Bertram de Rooij, Katherine Pittore and Hedzer Roodenburg Vermaat) gave an introduction on the country, the first circular challenges and needs identified and zoomed in into a specific refugee camp or settlement within that country. This formed the starting point for a joint fact finding and sharing personal experiences and thought, to really make a deep dive together.

The second part of the session was completely dedicated for matchmaking and building future consortia and circular concepts. To guide this on a structured way a circular consortium canvas was prepared by Outside Inc. In the end the session resulted in 6 potential consortia. The session was seen by all participants as very fruitful, inspiring and highly relevant.

Photos (above)
Dedicated sessions at the Dutch Design Week
Photo credits: Corine Abbas

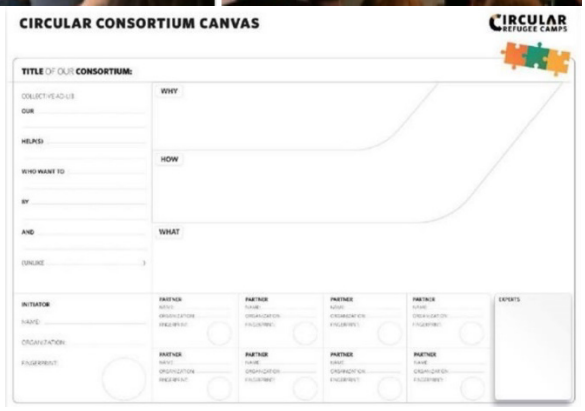


Illustration (right)
Format Circular Consortium Canvas

Table *Participating organizations Design Session (21-10-2019)*

Business organisations	Triple
	GhettoSmart
	Skill-Ed
	Coolfinity
	Tykn
	Andthepeople
	Semilla
	Unibricks
	ECOR
	Life Impact Company
	Up Cycling Plastics
	Pure Blue
	African Clean Energy
	Solar Dew
	RHDHV
	Waka Waka
	Practica
	Village Pump
	DEAN
	Developing a Waterfilter
	Qlobel
	Tensail
	Elemental WaterMakers
	Jerry Can Filter
	Ecosystem Kickstarter
Governmental organisations	Netherlands Enterprise Agency (RVO)
	VNG International
	World Waternet
Non-governmental organisations	IOM
	CARE Nederland
	Partos
	ASA
	GreenFieldCities
	Truvalu (ICCO)
	Plan International/WorldVision
	Innofest
	Aqua for All
	Red Cross
	DCHI
	ZOA
	PUM
Scientific institutions	Deltares
	Wageningen University & Research
	Clingendael
	TU Eindhoven
	Reliefbase
Core team	NLWorks
	Wageningen University & Research
	Netherlands Enterprise Agency (RVO)
	Outside Inc
	Spindle/Partos

2.3 Follow up session

From the initial 6 consortia which were formed at the Dutch Design Week five active consortia remained and took up the challenge to bring their initiative further. On Tuesday 26th of November a follow up session for the consortia was organised at the TU Delft.

During this meeting the most important and different elements of a future consortium were discussed thoroughly to build a solid base for future cooperation:

- Clear roles, responsibilities and ownership (lead and co-lead)
- Clear vision/aim
- Formulated criteria for success
- Shared proposition
- At least two companies/parties
- Complementary responsibilities/capabilities
- Clear individual and collective benefits/business case for all parties
- SMART arrangements with each other

The main outcomes and next steps are:

- The wish for a business coach to further develop a viable business model
- Connect consortia under one umbrella mission/ shared proposition
- Join forces (as Peter and Ruben decided) and create one plan together with CARE. Uganda becomes country of focus.
- To share outcomes with this group and reach out to one another

After this final session in 2019, via interviews per consortia the primary and most relevant knowledge questions and needs were inventoried as input for a dedicated Knowledge Agenda.

2.4 The core team

The current core team consists of NL Works, Wageningen University & Research (WUR), Outside Inc, the Netherlands Enterprise Agency (RVO) and Spindle/CARE.

The roles and added value of the different program partners (as proposed in the follow up session) are:

- CARE:
  Knowledge on local context and access to stakeholders
- Netherlands Enterprise Agency (RVO):
  Based on clear understanding of the plan/needs with programs or budgets
- Outside Inc.
  Facilitating movement, mentor community, coaching and start-up investment (via World Startup Factory)
- NL Works:
  Potentially offer support to the (international) coalitions
- Wageningen University and Research (WUR):
  Provides regular overview of potential tenders/calls to link. Will help to create a shared story upon which a program can be created. Besides WUR also can play an essential role in brokering existing knowledge and develop new knowledge, both on circular concepts as well as specific technical information, assessments and justification.

2.5 The consortia

During the design workshop in Eindhoven 6 consortia were initiated. During the last two months of 2019 5 active consortia remain.

The remaining consortia are:
- Waste to Taste
- African Clean Energy
- Last Mile Education
- Upcycling waste
- Circular Neighbourhoods

Of these 5 consortia probably 2 will also merge, Waste to Taste and African Clean Energy. In chapter 4 the consortia will be further be presented, including lead partner, partners, objective/first concept and specific knowledge questions. In the upcoming months the concepts, strategy and arrangements will be further elaborated by the consortia.

CIRCULAR REFUGEE CAMPS

size
000ha

5.000ha
CULTURAL LAND

=10 million p

total popu
44.270.

urban
10.525

rural population
33.745.000

efugees

3 Circular challenges captured

Refugee camps and large influxes of migrants bring along enormous pressures on the available natural resources in a specific area. This often lead to stress and conflict between the host community and the new settlers. Circular concepts as a broad concept, provide an outcome to reduces stress in an existing situation and avoid stress by the development of future (new) refugee camps. It is of utmost importance to properly address the primary challenges of an area -and the refugee camps and settlements within- to have the correct starting point and proper linkage to local needs, local commitment and local ownership.
To have well-informed context specific discussions, address specific needs and find the proper entry points to address circular challenges and mutual benefits, factsheets were compiled for three preselected countries and one of the most distinctive refugee camps or settlements within these countries.

The factsheets were used as input and starting point within the Design workshop on the 21st of October, but also serve as example for other analysis and first articulation towards circular solutions for other countries and areas.

3.1 Aim, method and data

The aim of the factsheets was to create a visual, concise summary of key indicators which addresses and captures the specific situation, circular challenges and potential linkages. The factsheets show comparative information, but also present the more specific country specific and area specific challenges to show both the diversity and link to the specific needs and urgencies and, as such, possible entry points for a circular concept.

The comparative information shown on each factsheet at country level is:
- Country size and share of (types of) agriculture land use
- Total population and share of rural and urban population
- Total population and share or rural and urban refugee population

Each factsheet also shows an actual map of current refugee camps and urban refugees with population size.

The comparative information shown on each factsheet at the level of refugee camp/settlement is:
- District information (area size, density and population size)
- Total population district and share of refugee population
- Total population and share or rural and urban refugee population

Based on available (thematic) country assessments of different institutions and local needs assessments and baseline reports of UNHCR or NGO's key indicators were selected for each country and refugee camp/settlement. These indicators were presented unbiased without direct linkages, but show the potential linkages or possible dependencies.

Data is widely available on the different themes, but spread along different sources. For the factsheets these different data sources and assessments were used and combined in one open storyline.

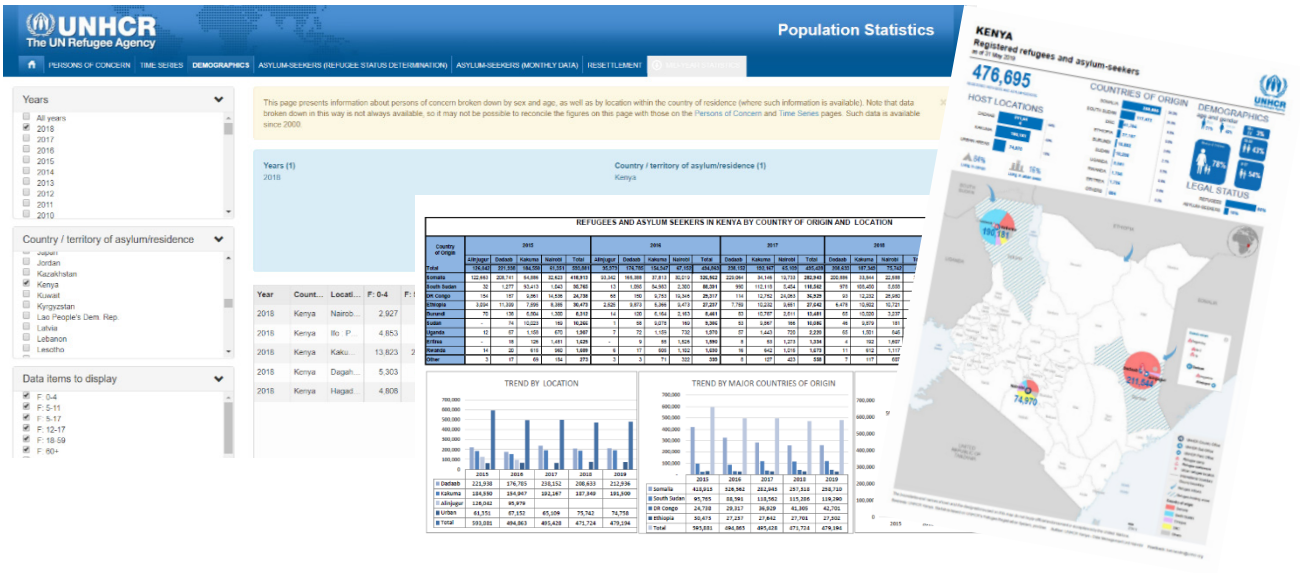
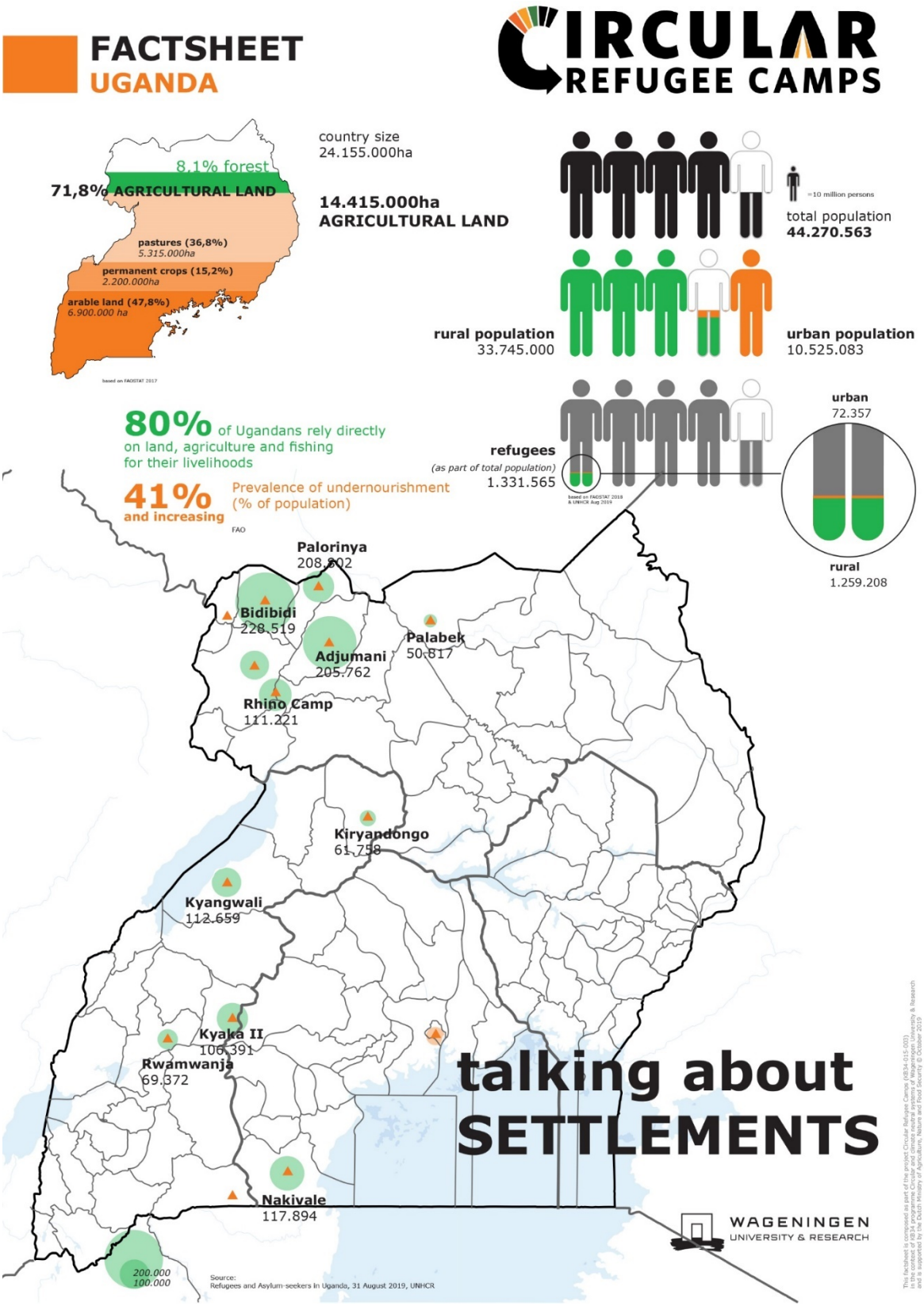


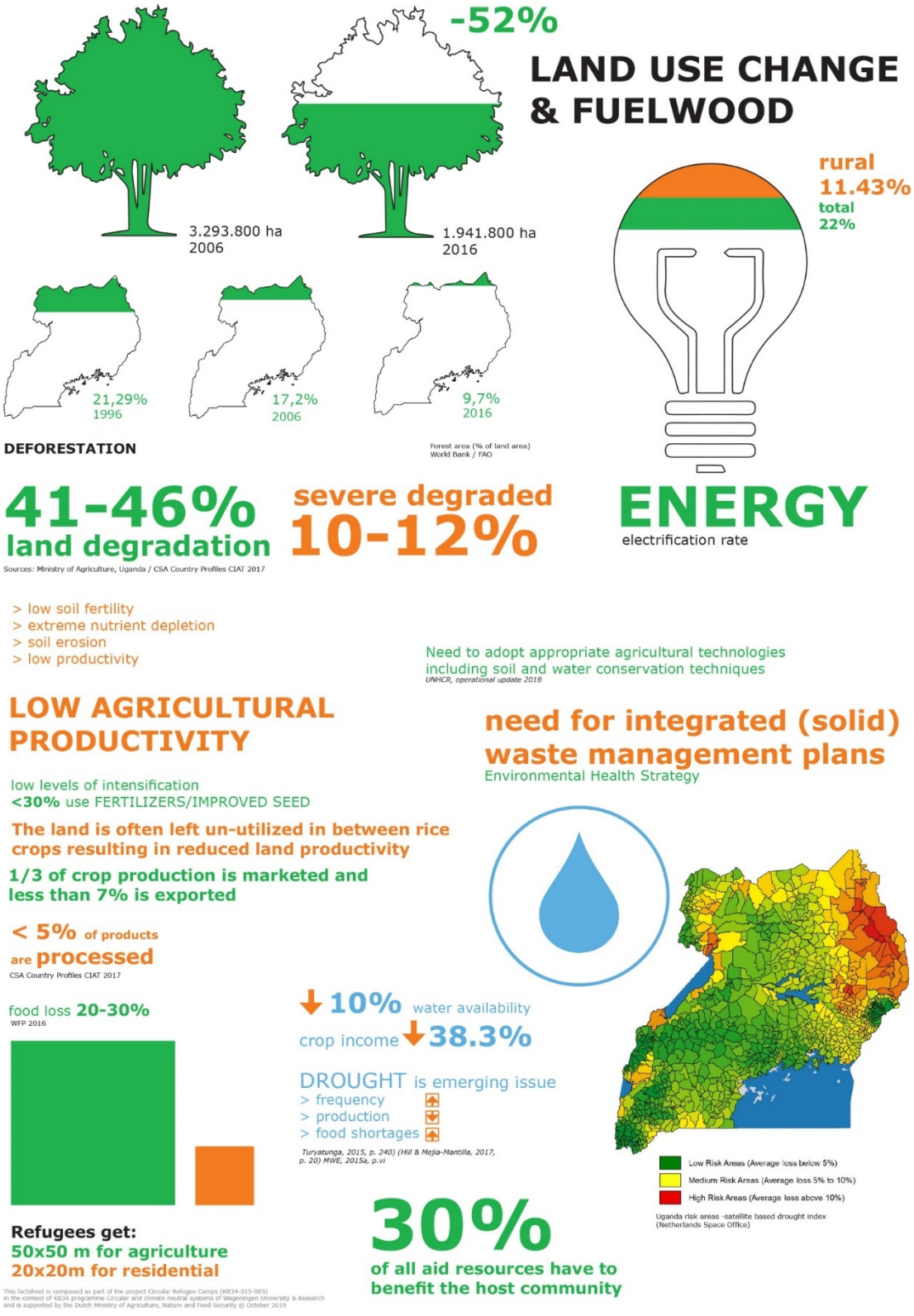
Figure 1 *Examples of UNHCR data available (UNHCR Population Statistics Kenya (popstats.unhcr.org), Kenya Infographic and Kenya Statistical Package)*

Primary data sources at country level were FAOstat, the FAO Country profiles, UN Population statistics, UNHCR population statistics and country updates, AquaStat and the WorldBank Statistics and Country Profiles. At the level of refugee camp/settlement the UNHCR operational updates and needs assessments were the primary sources. Depending on the specific topics and challenges that were addressed extra supporting or specific data was gathered and verified from different (local) sources.

3.2 Factsheets

The core group selected three countries as focus countries for the first stage: Kenya, Uganda and Jordan. For these countries the factsheets, format and methodology was developed. The factsheets are presented on the following pages.

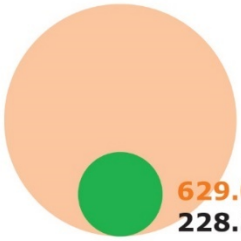

FACTSHEET
UGANDA
CIRCULAR
REFUGEE CAMPS
8,1% forest
71,8% AGRICULTURAL LAND
pastures (36,8%)
5.315.000ha
permanent crops (15,2%)
2.200.000ha
arable land (47,8%)
6.900.000 ha
based on FAOSTAT 2017
country size
24.155.000ha
14.415.000ha
AGRICULTURAL LAND
=10 million persons
total population
44.270.563
rural population
33.745.000
urban population
10.525.083
refugees
(as part of total population)
1.331.565
based on FAOSTAT 2018
& UNHCR Aug 2019
urban
72.357
rural
1.259.208
80% of Ugandans rely directly
on land, agriculture and fishing
for their livelihoods
41%
and increasing
Prevalence of undernourishment
(% of population)
FAO
Palorinya
208.602
Bidibidi
228.519
Adjumani
205.762
Palabek
50.817
Rhino Camp
111.221
Kiryandongo
61.758
Kyangwali
112.659
Kyaka II
106.391
Rwamwanja
69.372
Nakivale
117.894
200.000
100.000
Source:
Refugees and Asylum-seekers in Uganda, 31 August 2019, UNHCR
talking about
SETTLEMENTS
WAGENINGEN
UNIVERSITY & RESEARCH
This factsheet is composed as part of the project Circular Refugee Camps (KB34-015-003)
in the context of KB34 programme Circular and climate neutral systems of Wageningen University & Research
and is supported by the Dutch Ministry of Agriculture, Nature and Food Security © October 2019


-52%
LAND USE CHANGE & FUELWOOD
3.293.800 ha
2006
1.941.800 ha
2016
rural
11.43%
total
22%
21,29%
1996
17,2%
2006
9,7%
2016
DEFORESTATION
Forest area (% of land area)
World Bank / FAO
41-46%
land degradation
severe degraded
10-12%
ENERGY
electrification rate
Sources: Ministry of Agriculture, Uganda / CSA Country Profiles CIAT 2017
> low soil fertility
> extreme nutrient depletion
> soil erosion
> low productivity
Need to adopt appropriate agricultural technologies including soil and water conservation techniques
UNHCR, operational update 2018
LOW AGRICULTURAL PRODUCTIVITY
need for integrated (solid) waste management plans
Environmental Health Strategy
low levels of intensification
<30% use FERTILIZERS/IMPROVED SEED
The land is often left un-utilized in between rice crops resulting in reduced land productivity
1/3 of crop production is marketed and less than 7% is exported
< 5% of products are processed
CSA Country Profiles CIAT 2017
food loss 20-30%
WFP 2016
10% water availability
crop income 38.3%
DROUGHT is emerging issue
> frequency
> production
> food shortages
Turyatunga, 2015, p. 240) (Hill & Mejia-Mantilla, 2017, p. 20) MWE, 2015a, p.vi
Low Risk Areas (Average loss below 5%)
Medium Risk Areas (Average loss 5% to 10%)
High Risk Areas (Average loss above 10%)
Uganda risk areas -satellite based drought index (Netherlands Space Office)
Refugees get:
50x50 m for agriculture
20x20m for residential
30%
of all aid resources have to benefit the host community
This factsheet is composed as part of the project Circular Refugee Camps (KB34-015-003) in the context of KB34 programme Circular and climate neutral systems of Wageningen University & Research and is supported by the Dutch Ministry of Agriculture, Nature and Food Security @ October 2019

FACTSHEET
UGANDA

CIRCULAR REFUGEE CAMPS

BIDI BIDI SETTLEMENT



YUMBE DISTRICT

area	2321 km2
	232.100 ha
density	271,2 /km2

forest 2010 63800 ha (28%)
estimated loss 2001-2018
7730ha (8,5%)

www.globalforestwatch.or

Total HOUSEHOLDS
43.264

87% WOMEN & CHILDREN

anual deficit woody biomass Bidibidi

314.180 tonnes per day

depletion is URGENT MATTER

fuelwood consumption Bidibidi

952 tonnes per day

347.480 tonnes per year

2017 baseline for the Bidibidi settlement, FAO UNCR 2017

There is a **clear risk of high levels of deforestation and land degradation due to the increased woodfuel demand** caused by the sudden influx of refugees to the Bidibidi settlement.

It should be a priority to improve the management of existing forests and other woodlands and to plant trees to increase the production of woody biomass in the settlement and on the lands of the host community.

Rapid woodfuel assessment 2017 -baseline for the Bidibidi settlement, Uganda FAO/UNHCR

Photo: www.maf-uganda.org

Dependency on water trucking operations high

BIDI BIDI 46%

settlements almost **2x** higher demand than host communities

Data collection survey on social infrastructure needs of refugee-hosting communities in Northern Uganda, July 2018

LAND ISSUES

> Quality of land

"refugees argue that land is impossible to cultivate, either because it too rocky or too close to livestock or too far from their home"

> Land dispute

"The Bidibidi settlement is located on the communal land of the Aringa people, who are governed by customary laws. In general, communal land falls under the control of the specific clan with historical claim to the area. Under this system, each clan has a designated "land chief" responsible for speaking on behalf of the community. Most of Bidibidi is on land that was not used prior to the refugees' arrival, as it was considered unsuitable for agriculture. But....

this land supported hunting, livestock grazing and charcoal production critical to the livelihood of the host population.

Conflict dynamics in the Bidibidi refugee settlement in Uganda, Conflict Trends 2018/4, ACCORD

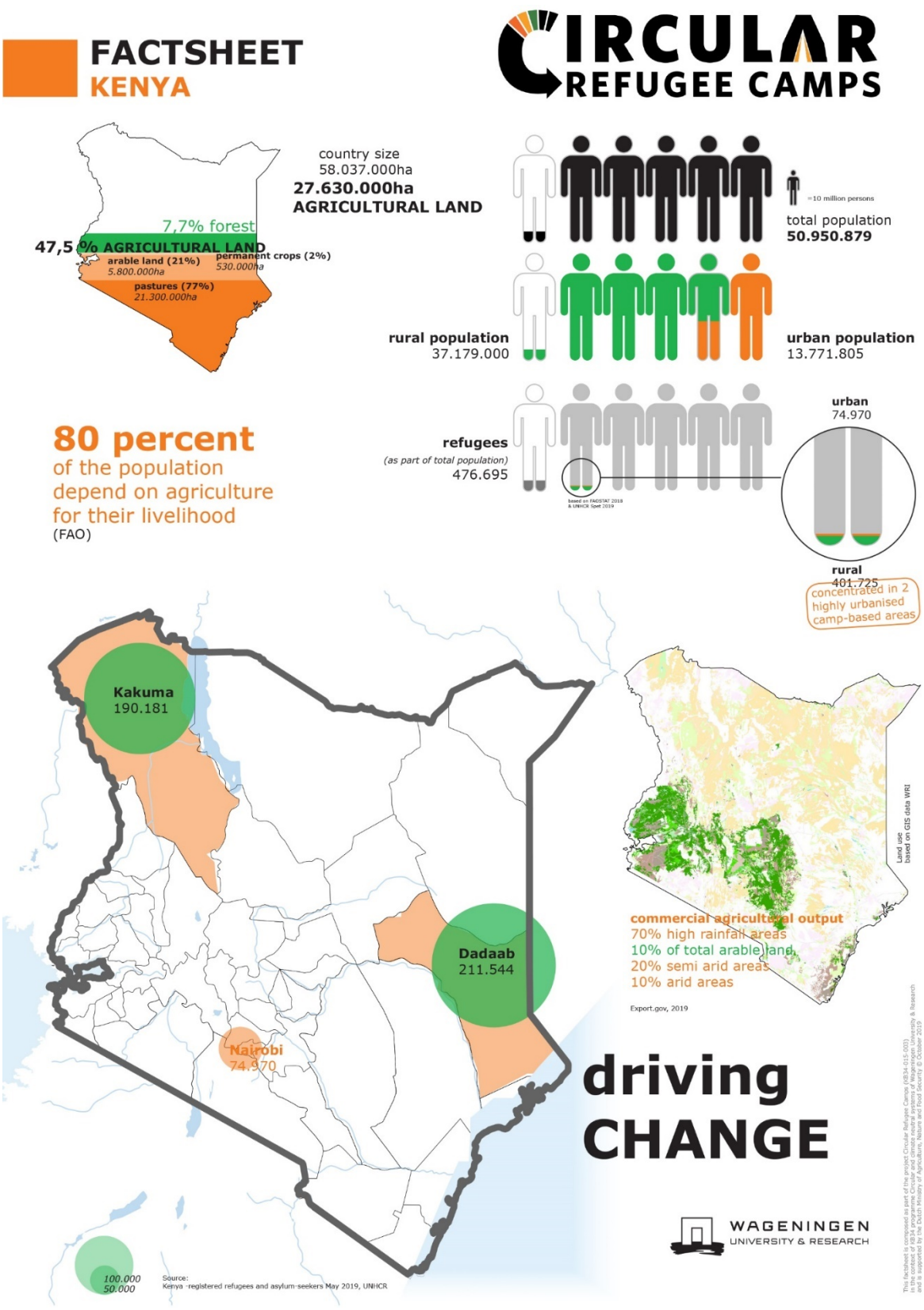
Conflicts over access to firewood and environmental degradation

need a more focused approach to address the core structural driver of the conflict.

Conflicts over natural resources are real and unresolved.

Contested Refuge: The Political Economy and Conflict Dynamics in Uganda's Bidibidi Refugee Settlements, 2018

This factsheet is compiled as part of the project Circular Refugee Camps (BO-11-015-003) in the context of KB34 programme Circular and climate neutral systems of Wageningen University & Research and is supported by the Knowledge Base Programme, Ministry of Agriculture, Nature and Food Security.


FACTSHEET
KENYA
CIRCULAR
REFUGEE CAMPS
country size
58.037.000ha
27.630.000ha
AGRICULTURAL LAND
7,7% forest
47,5 % AGRICULTURAL LAND
arable land (21%)
5.800.000ha
permanent crops (2%)
530.000ha
pastures (77%)
21.300.000ha
=10 million persons
total population
50.950.879
rural population
37.179.000
urban population
13.771.805
refugees
(as part of total population)
476.695
urban
74.970
rural
401.725
concentrated in 2 highly urbanised camp-based areas
80 percent
of the population
depend on agriculture
for their livelihood
(FAO)
Kakuma
190.181
Dadaab
211.544
Nairobi
74.970
100.000
50.000
Source:
Kenya -registered refugees and asylum-seekers May 2019, UNHCR
Land use
based on GIS data WRI
commercial agricultural output
70% high rainfall areas
10% of total arable land
20% semi arid areas
10% arid areas
Export.gov, 2019
driving
CHANGE
WAGENINGEN
UNIVERSITY & RESEARCH

WATER STRESS 33,2% Aquastat

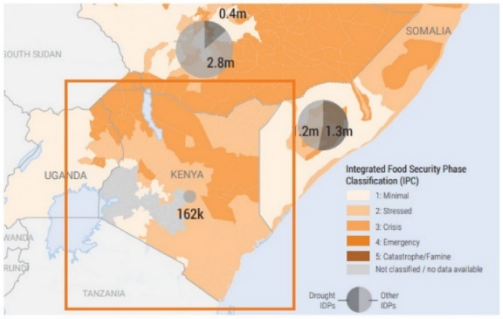
Freshwater withdrawal as % percentage of total renewable water resources

13,13 % (2016)

at COUNTRY LEVEL
...but big regional differences

By sector (% of total water withdrawal)
AGRICULTURE 80,21%
INDUSTRIAL 7,5%
MUNICIPAL 12,28% Aquastat

prevelance of severe food insecurity
35.6%



Drought Snapshot, OCHA, June 2019

"Kenya drought: More than a million people face starvation

Months of rain have just ended but weather experts say it was not enough to prevent worsening food and water shortages.

Drought has left more than a million people on the brink of starvation in northern Kenya."

Aljazeera -August 2019

23 counties =**80% country**
11 counties ALERT
10 counties ALARM **DROUGHT**

- 9.8%

(2001-2018)
GlobalForestWatch

3.180.000ha forest (2010)
326.000 ha lost 10%

Pastoral & agro-pastoral areas

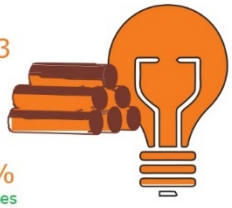
Pasture and water shortages in pastoral areas affecting livestock conditions

..and severely affected food access and availability

FAO COuntry Brief, 2019

fuel wood > 70%
of national energy demand
Renewable Energy Consumption 94,75%
depends on traditional use of biomass
annual deficit 7 million m3
Kenya Forest Service, 2010

LOW energy efficient
COOKING METHODS
13% acces to clean cooking



access to electricity 63,8%
>rural 58% boosted via renewable sources
WorldBank (2017)

cumulative rains
70% below average
FAO COuntry Brief, 2019

production levels down
increasing food prices (30-70%)

2x HIGHER DEPENDENCY
on foreign markets
TO FEED CITIZENS
(2010 - 2015)

over-reliance on rain-fed agriculture
has seen her increasingly resort to imports in the event of dry weather.

Economic Survey 2018, Kenya National Bureau of Statistics

Major food imports Economic Survey 2018
maize, unmilled wheat, wheat flour, rice & sugar

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FACTSHEET
KENYA

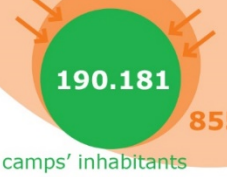
CIRCULAR REFUGEE CAMPS

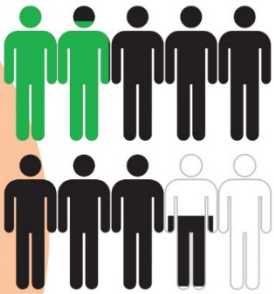
KAKUMA CAMP & KALOBEYEI SETTLEMENT

Turkana COUNTY
area 68.680 km2
6.868.000 ha
density 12.45 /km2

(SEMI)**ARIDE AREA**

- **Kakuma 1,2,3 and 4**
  First settlement 1991
  Total of 4 settlement clusters
  13.5 km2
  density 12.000 /km2
- **Kalobei**
  Established 2015 as planned settlement
  15 km2





total population
855.359 *(2009)*
& refugees
(as part of total population)

> food assistance main source of food
> food insecure region
> harsh climatic conditions
Joint Assessment Mission – Kenya Refugee Operation, 2014

Food assistance is far from meeting **Recommended Daily Intake**
> deteriorating nutrition status
UNHCR, 2019

90% of the camps' inhabitants originally **pastoralists** with limited knowledge of environmental practices

Low dietary diversification due to high prices of fresh fruits and vegetables results in an **increase in micro-nutrient deficiencies** such as anemia, scurvy and stunting.

Road conditions affect the availability oferishable food as the average resupply time in the camp doubles from 1.5 days in the dry season to 3 days in the rainy season

21 BOREHOLES supply water to residents of Kakuma and Kalobeyei

To promote safe and equitable distribution of water there is a need to **explore and invest in alternative sustainable sources**
UNHCR, 2019

disputes over water sources

only 5% ACCESS TO ELECTRICITY
1.063 solar streetlights installed

SOIL HARVESTING for BRICKS

TURKANA
forest loss 2001-2018 178ha
of forest 4540ha (2010) =4%

Ongoing demand for SHELTER CONSTRUCTION MATERIALS such as wood and walling bricks

&

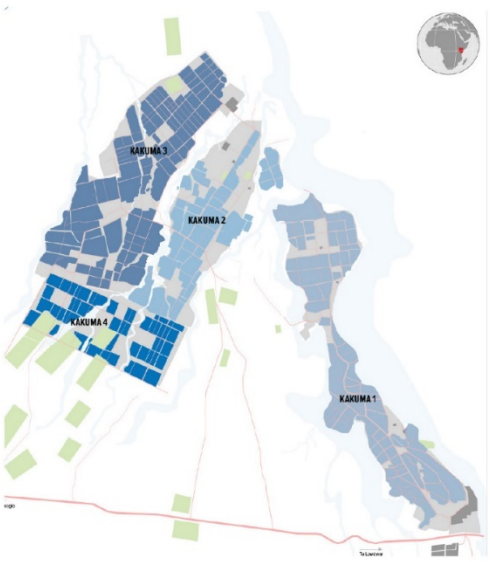
Refugee households **rely entirely on fuel-wood** for all domestic energy needs

>80% harvested within 25km radius

340 Households issued with energy saving stoves
UNHCR, 2019

organized
SUPPLY MEETS <20%

75% of the host community members **MAIN SOURCE INCOME SELLING CHARCOAL & FIREWOOD to refugees**



camp's **informal economy** is thriving

IFC World Bank, 2018

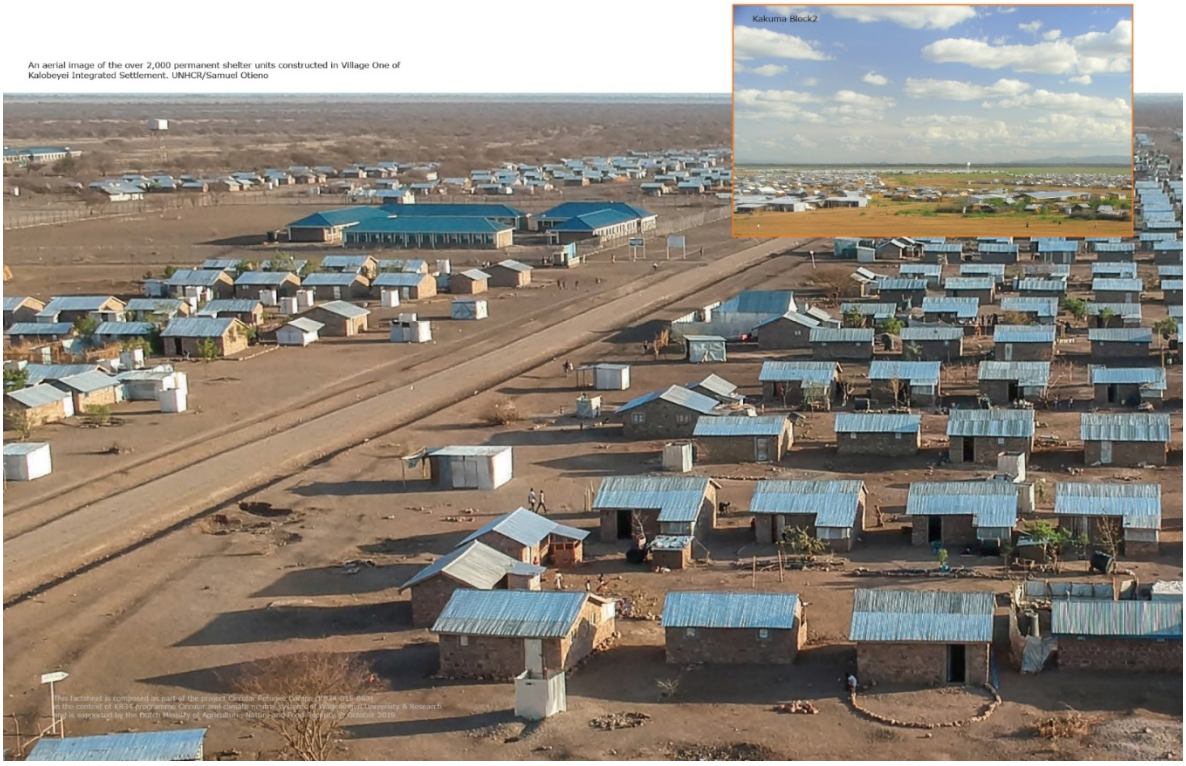
need to **construct household latrines**
to replace communal latrines

> 624 communal pit latrines in Kalobeyei settlement
> 10,437 family pit latrines in Kakuma

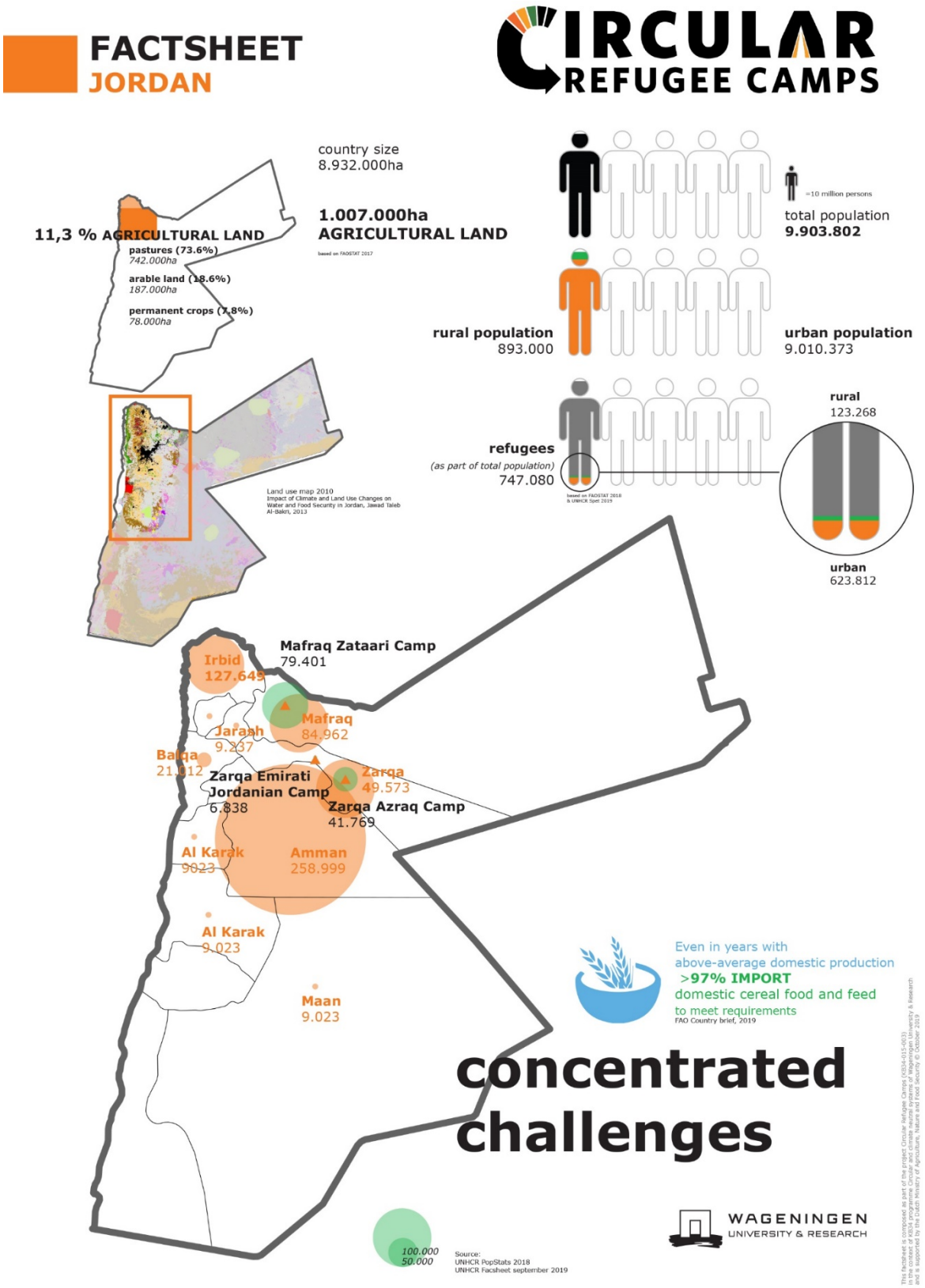
2,000 businesses
14 wholesalers
10 major markets

drop out
PASTORALISM
host communities

> Conflicts over resources like GRAZING PASTURES between refugees and host communities
> Water boreholes for humans and livestock



An aerial image of the over 2,000 permanent shelter units constructed in Village One of Kalobeyei Integrated Settlement. UNHCR/Samuel Otieno


FACTSHEET
JORDAN
CIRCULAR REFUGEE CAMPS
country size
8.932.000ha
11,3 % AGRICULTURAL LAND
pastures (73.6%)
742.000ha
arable land (18.6%)
187.000ha
permanent crops (7.8%)
78.000ha
1.007.000ha
AGRICULTURAL LAND
based on FAOSTAT 2017
=10 million persons
total population
9.903.802
rural population
893.000
urban population
9.010.373
refugees
(as part of total population)
747.080
based on FAOSTAT 2018
& UNHCR Sept 2019
rural
123.268
urban
623.812
Land use map 2010
Impact of Climate and Land Use Changes on
Water and Food Security in Jordan, Jawad Taleb
Al-Bakri, 2013
Mafraq Zataari Camp
79.401
Irbid
127.645
Mafraq
84.962
Jarash
9.237
Balqa
21.012
Zarqa Emirati
Jordanian Camp
6.838
Zarqa
49.573
Zarqa Azraq Camp
41.769
Al Karak
9023
Amman
258.999
Al Karak
9.023
Maan
9.023
Even in years with
above-average domestic production
>97% IMPORT
domestic cereal food and feed
to meet requirements
FAO Country brief, 2019
concentrated
challenges
100.000
50.000
Source:
UNHCR PopStats 2018
UNHCR Facsheet september 2019
WAGENINGEN
UNIVERSITY & RESEARCH
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WATER STRESS 100,1% Aquastat

Freshwater withdrawal as % percentage of total renewable water resources

96,42 % (2016)

By sector (% of total water withdrawal)
AGRICULTURE 53,13%
INDUSTRIAL 3,1%
MUNICIPAL 43,7% Aquastat

76 BILLION LITERS/YEAR
lost by leakage
Tapped Out, MercyCorps, March 2014

2020 > 2030
20% to 30% less PRECIPITATION

temperature **+6 °C** and the number and duration of droughts will double.

number
duration **DROUGHT X2**

Future adaptation to extreme droughts in Jordan will be an immense challenge. The projected negative impacts of more severe droughts of greater duration
CALLS FOR ESSENTIAL ALTERNATIVES

Increasing drought in Jordan: Climate change and cascading Syrian land-use impacts on reducing transboundary flow, Rajsekhar 2017
Jordan Water Project, Stanford Woods Institute for the Environment's Global Freshwater Initiative, 2017

Jordan's annual renewable resources of less than
100m³ per capita
are far below the global threshold of severe water scarcity of 500m³ per capita
UNHCR

OVEREXPLOITING GROUNDWATER RESOURCES
Amman Zarqa
194%
OVERPUMPING RATE
155% average Jordan

Jordan -Water along the food chain, FAO 2015

96.81 %
Energy imports 2014
Net % of energy use
WorldBank

Reused wastewater is an essential element of Jordan's water strategy. Sewage treated wastewater should be the most important source of water in irrigation in the near future.
FAO Aquastats

By the end of 2018, Jordan was producing 1,130MW of power from renewable energy resources, accounting for about 11%o f total electricity requirements.

Waste generation
urban 0.9 kg/person/day
rural 0.6 kg/person/day
50% ORGANIC
Solid Waste value chain analysis Irbid & Mafraq -Jordan, UNDP 2015

AMBITION JORDAN
to **BOOST RENEWABLE**
ENERGY SOURCES 20% by 2025
Ministry of Energy & Mineral Resources (MEMR), 2019

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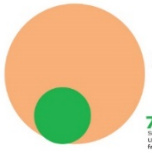
FACTSHEET JORDAN

CIRCULAR REFUGEE CAMPS

AL ZA'ATARI



Al Mafraq
Al-Bādīah ash-Shamāliyah al-Gharbiyah
area 669 km2
66.900 ha
density 369.4 /km2

population 247.031 (2015)
74.965 (2004)

Qasabah al Mafraq
area 601 km2
density 326.7 /km2

population 196.196 (2015)
101.712 (2004)

ARID AREA

5,3 km2

12.9-megawatt SOLAR PLANT
opened in November 2017

saves around **5.5 million US $/year**
provision of electricity to refugees' homes
from **8 hours up to 12 hours**

SOLID WASTE management

& community-led
LOW COST RECYCLING
are priorities *UNHCR, 2019*

0.85 kg solid waste
produced per person per day
M.N. Saidan et al./Waste Management 61 (2017)

750m3/day SOLID WASTE

WASTE GENERATION
60 TON/DAY *UNHCR, 2016*

currently controlled dumping at
the Al-Hussainyyat dumpsite

> 259 tonnes
collected every week for recycling.
Recycle project Oxfam, Sept 2019

water & waste water NETWORK
recently developed

2016
>3 internal wells
CAPACITY 3,800m3
> wastewater treatment plant
CAPACITY 3,600m3/d;

+ piped water supply distribution system
+ piped sewage network

UNHCR, 2019

...still 35 liters per person per day,
which is under the absolute water scarcity level (of 60 l)?
IFPO, 2018

20 additional watertrucks /day
UNHCR, 2017

WASTE TO ENERGY
initiative for **2 BIOGAS HUBS**

food and animal waste
> clean and safe fuel and fertilizer

2016 Clinton Global Initiative (CGI) and Solar C3ITIES

progress?

WAGENINGEN UNIVERSITY & RESEARCH

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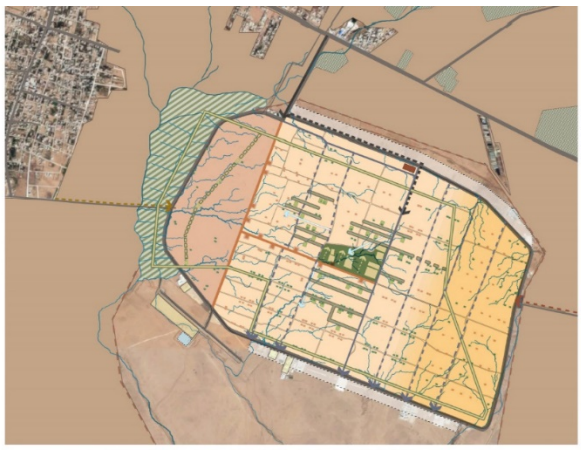

Source: Concept Design WADI PARK, Za'atari Jordan, Lodewijk Baljon Landscape Architects 2018

Work permit holders

37% of Zaatari Camp working age population (18 to 60)

Factsheet Al Zaatari, UNHCR, 2019

entrepeneurship & EMPLOYMENT

3,000 businesses with a total value of **$13 million** per month

WEF, 2019

ZA'ATARI WADI *flood management*

3.3 Outreach and uptake

Even though the factsheets were first presented to an audience that was well informed about the different countries and situations, they were highly appreciated and valued. Even for some true initiative new insights came forward. Not per se only via new data, but also the way it was presented. Furthermore the factsheets really helped in finding focus, dependencies and crucial linkages. Often current data is thematical presented and not visualized, which doesn't emphasize the real problem or (potential) impact, or -on the other hand- visualising helped also in easily showing the real ratio of refugee populations and host communities, sometimes tempering the current imaging or stretching it.

The conclusion is this way of analysing and representing is very helpful in the process towards circular solutions. It is a method that could be easily adopted for other countries and areas. It also shows the diversity in challenges, problems and opportunities for circular solutions, depending on a proper situational analysis at different levels.

The factsheets should be seen as a first basis for discussion, cooperation and integration. Based on these first outlines and concepts a situational analysis and participatory process should follow to verify and build common understanding, shared visioning and commitment and ownership, especially with the local management and local (refugee and host) communities.

4 Knowledge Agenda

Each consortium has been asked for the most important knowledge questions which could help improving the consortium, its concept and ambitions and most of all the steps towards actual implementation. These knowledge questions are combined into an overall knowledge agenda to be addressed for follow up actions and are summarized in this chapter. For this Knowledge Agenda we focus on the analytical and technical actions. All consortia also ask for support in lobby, governance strategy and clear commissioning and (local) ownership and participation. This are actions which could be supported by the outcomes of the analytical and technical actions but should be primary addressed to the program partners RVO and NL Works.

4.1 Consortia and specific knowledge questions

In this paragraph an overview is given of different consortia, including objective, general concept and related knowledge questions. These knowledge questions are gathered via brief interviews with the lead partner of each consortium.

Waste (water) to Taste (*possibly teaming up with African Clean Energy)*
Coordinator: Semilla
Partners: World Waternet, Elemental Waters, Practica, Village Pump, RVO

The consortium of Waste to Taste aims to build a circular concept in which improved sanitation and hygiene and waste water flows (WASH) are used to provide sustainable irrigation water and compost for improved local production of a variety of nutritious food, especially focused on vegetables, and tree plantations. This will lead to upcycling waste (water) to essential basic needs (food, energy, green healthy environment) and improves local employment. Besides, improving the environment via greening and sustainable agriculture practices could also have a positive impact on potential tourism.

<u>Knowledge needs</u>
1. Supportive actions
> Stakeholder analysis
> Specific needs assessment
> Analysis social and cultural acceptance and boundary conditions
> Analysis local governance aspects and legal conditions

2. Concept development
> Concept sheet development

3. Technical support
> Purification: justification and norms
> Composting techniques
> Tree nursery and tree plantation design, techniques and cultivation protocols

4. Business case development and business models
> Quantification (input/output),
linked to available resources/needs in local case studies/potential pilot areas
> Risk assessment
> Cost-benefit analysis

African Clean Energy (*possibly teaming up with Waste (water) to taste)*
Coordinator: African Clean Energy
Partners: CARE Nederland

In many areas the lack of sufficient and reliable energy sources in and around refugee camps and settlements are causing major environmental degradation due to deforestation. The consortium African Clean Energy aims at introducing and upscaling alternative energy sources with additional activities for forest regeneration. This includes projects on tree planting, building tree nurseries, forest protection, and training and education to ensure not only additional forest recovery, but also to make the end users self-reliant in protecting their own surrounding environment. These activities are in addition to the already positive impact of switching to alternative energy sources. A potential link could also be made between the implementation and integration of solar fields, agriculture and regeneration of biodiversity and soil quality.

Knowledge needs
1. Supportive actions
> Analysis social and cultural acceptance and boundary conditions
> Analysis local governance aspects and legal conditions

2. Concept development
> Concept sheet development

3. Technical support
> Forest (re)generation strategy and techniques
> Contextualized spatial planning and implementation strategy

4. Business case development and business models
> Business modelling and feasibility study

Last Mile Education
Coordinator: SkillEd
Partners: Qlobel, ZOA, RVO

The consortium Last Mile Education puts an emphasis on the importance of empowering and enabling refugees via mobile and blended training programs, with a focus on water management, food production and circular solutions. Training will include both technical and practical guidance and skill development, but also the development of entrepreneurship and making necessary information available. As such, this consortium could also add value to the other initiatives.

Knowledge needs
1. Supportive actions
> Stakeholder analysis
> Specific needs assessment
> Analysis social and cultural acceptance and boundary conditions
> Analysis local governance aspects and legal conditions

2. Concept development
> Concept sheet development

3. Technical support
> Latest information about actual situation/conditions, best practices and guidance

4. Business case development and business models
> Business modelling
> Scalability and replicability
> Blended financing

Upcycling waste
Coordinator: Upp!
Partners: CPGG/Innofest, VNG International, RVDHV, RVO

The consortium Upcycling waste (Zero Waste) aims at upcycling local plastic waste to products to fit local needs (i.e. building materials) by developing local modular mobile installations.

Knowledge needs
1. Supportive actions
> Stakeholder analysis
> Specific needs assessment
> Analysis social and cultural acceptance and boundary conditions
> Analysis local governance aspects and legal conditions

2. Concept development
> Concept sheet development

3. Technical support
> Latest information about actual situation, best practices and guidance

4. Business case development and business models
> Business modelling
> Scalability and replicability
> Blended financing

Circular Neighbourhoods
Coordinator: Ghetto Smart
Partners: ReliefBase, Bucon, Deltares, Upp!, Aqua for All, Jerry can filter, AndThePeople and WetlandTec

The initiative circular Neighbourhoods is focussing on the slums in which many refugees settle in highly urbanised environments. Starting point for this consortium is the green housing-concept, in which green techniques for building, sanitation, waste and waste water management are connected towards a circular concept. This could gear up towards sustainable green slumps. By bringing in this system thinking, instead of single solutions, this could improve living conditions and in the end also lower costs. Bringing in a viable concept with low-cost, affordable and sustainable (low-maintenance) techniques, but with maximum impact. The consortium is looking at the correct starting points/techniques and desired leverage points. Ghetto Smart has a good local network.

Knowledge needs
1. Supportive actions
> this consortium is very good acquainted with the local situation and stakeholders

2. Concept development
> Concept sheet development

3. Technical support
> Low-cost, affordable techniques

4. Business case development and business models
> Business modelling
> Scalability and replicability
> Risk assessment and implementation strategy

4.2 Knowledge Agenda

Each consortium has been asked for the most important knowledge questions that arise while bringing the consortia, the ambitions and concepts further.

Most consortia are struggling with potential business models, especially given the specific situation, the end user groups and circularity. What would be the best model to use for each concept and how to reduce risks in business and risks in systemic sustainability?

Furthermore it would be helpful to build for each consortium a visual concept sheet which elaborates on the specific circularity, the spatial and functional translation and potential impacts. These concept sheets will also help in addressing specific follow up actions on targeted measures and techniques to be put in place and form a basis for requested analysis on input/output analysis and modelling, feasibility studies and risk analysis. But most of all, these concept sheets also help in developing an overarching storyline for the program as a whole.

Different consortia also would like to have a better situational analysis for pilot areas, including social contextualisation and quantification of available resources. The last will also be essential for the input/output analysis.

Finally a thorough supporting stakeholder analysis and shared fact finding and co-creation with local stakeholders and key stakeholders in terms of government and camp management for the specific pilot areas are crucial.

As such, the Knowledge Agenda for the upcoming years will consists of 4 pillars:

> Circular concept support and contextualisation (concept sheets)
The project resulted in 5 potential circular initiatives. Each initiative clearly links different needs and opportunities. To develop good business cases and a solid evidence base on available resources and preferred outcomes and output there is a need to meticulously draft the circles and become more specific.

Which loops are closed? How are these loops connected to each other? Which resources are part of these loops and what output is generated? Which actors are actively involved in these loops, how and at what stage? Where in these loops will new techniques or innovations be included? What could be potential entry points for implementation and which dependencies are alike?

Based on each overall concept sheet overall contextualisation can take place for specific selected and targeted areas. Each concept will be tailored to the actual local situation, actual available resources and local organisation. This should be based on actual situational analyses, quantification and both based on available information and preferably with stakeholder consultation and participation (shared fact finding and co-creation).

> Technical support, assessments and justification
Different consortia have already addressed specific technical knowledge questions.
The following research questions are brought forward:

- Waste water treatment
  What are actual (local) norms? For what purposed can the purified water be used best, also based on cost/benefit and degree of purification? To what extend can the water be re-used based on acceptance?
- Composting techniques
  Which composting techniques are available? What are the actual (local) norms? What are the available and preferred basis materials and preferred output generated?
- Tree nursery and plantation design
  Which kind of trees are most suitable and for what purpose? What is the best (functional) design and which management practices should be included?

- Cultivation protocols
  What are best management practices for the cultivation of plantations and vegetable gardens?
- Forest (re)generation strategy and techniques
  How and where should forest (re)generation be applied? What is needed?
- Spatial planning
  What is the need and role of spatial planning in putting the circular concept into effect? Which legislation or regulation is needed?
- Cost/benefit analysis
  What are the costs and benefits of the circular concept and the essential parts within? When would this lead to a sustainable business model?
- Quantification (input/output)
  Which resources are available and to what extent and with what quality? What is the actual and estimated/latent demand?

> Social contextualisation, stakeholder participation and acceptance (acculturation)
The different consortia also are raising questions about the social aspects of circularity and the different techniques to put in effect. What is for instance the degree of acceptance of certain re-use and which cultural values or aspect apply and to which extent?
A concise stakeholder analysis and power scheme is also required, including a good (training) needs assessment to reach optimal ownership, uptake and capacity building.

- Stakeholder analysis (pilot based)
  Which stakeholders can be identified for the specific sites and regions? What are their importance and influence? And last but not least which interests and capacities does each stakeholder has? How are the power schemes? Which stakeholder strategy should be put into place?
- Training needs assessment (pilot based)
  Which training needs are crucial to put circular concepts into effect?
- Analysis Cultural aspects and circularity
  Which cultural aspects should be taken into account that could hinder (certain) circulair concepts and solutions? In what way should this be dealt with?
- Analysis local governance and legal aspects
  How is the current governance structure and legislation, also regarding the different themes that are linked within a circular concept? Which change is needed and which governance strategy is needed?

> Business case modelling
Last but not least, each consortium is struggling with the business models.

Which innovative business models are available, applicable and feasible? Is the circular concept depending on an overall central business model or could it build upon several aligned business models and cases? What are the dependencies and the risks? Who are clients and end-users and are they the same? Which financial arrangements are possible, for starting the initiative and sub-initiatives and sustaining the initiative in the long-term?

So an essential part of the research agenda is:
- Inventory applicable business models
- Inventory financial arrangements
- Risk assessments and cost benefits analysis

Tree nursery in Kyangwali -Uganda
(Photo credit: Bertram de Rooij)

5 Conclusion and next steps

The actions and research performed in 2019 have paved the way forward to actual concrete concepts and steps towards circular solutions to improve living conditions and livelihood opportunities in and around refugee camps and settlements. During the Design Session a preliminary pathway was presented towards actual implementation.

The proposition is to dedicate the upcoming year to bring the consortia further by:
- Technical and design support elaborating, strengthening and substantiate the circular concepts
- Contextualize the circular concepts to specific countries/areas (situational analysis)
- Inception missions to selected areas

The supportive actions should be a joint effort of NL Works, Spindle, Netherlands Enterprise Agency (RVO) and Outside Inc. and include:
- Stakeholder analysis for selected countries/areas
- Stakeholder strategy (consultation and participation)
- Analysis local governance aspects and legal (boundary) conditions

- Overall program management and program story line
- Extending network with strategic (international) partners (i.e. UNHCR, local government)

Based on these outcomes each consortium could start the actual implementation on pilot level by 2021, which should form a basis for further testing, assessing and scaling up.

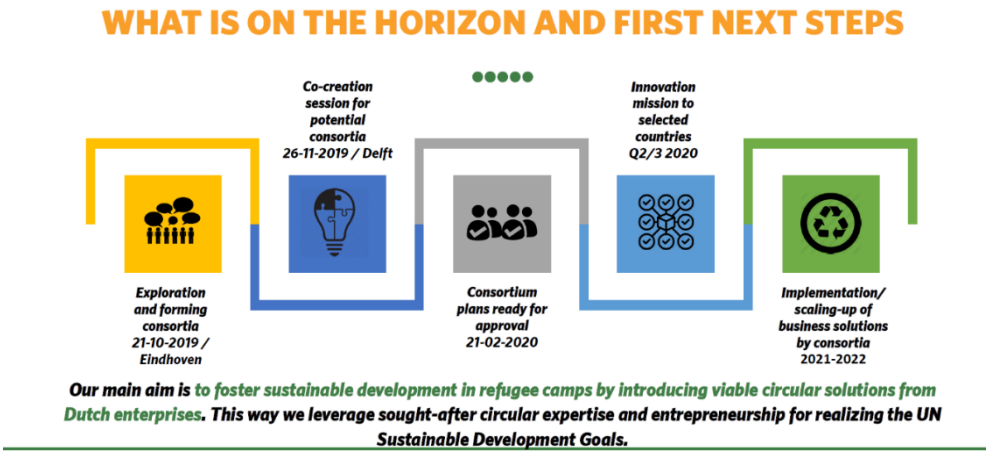

Figure 2 *Preliminary planning Next steps and horizon*

5.1 Workplan 2020

The suggested workplan for 2020 for the Knowledge Basis is set along the following 4 tasks. The main efforts should be focused on the development and context specific elaboration of the circular concepts. The other activities are in joint effort with the program partners, but are seen as highly strategic, also with the aim to expand and arrange broad (international) support and new partnerships.

- **Task 1: Supportive actions:**
  Design workshops (per consortia/concept)
  Inception missions to selected countries/areas
  Knowledge network/brokering
- **Task 2: Extending network:**
  International and local stakeholder analysis
  International and local stakeholder consultation
- **Task 3: Concept sheets and context specific elaboration:**
  Design of concept sheets
  Uptake of concept sheets to selected countries/areas
  Technical assistance (supportive to concept sheets)
- **Task 4: Dissemination & communication:**
  Building storyline
  Joint communication strategy (website, social media, press)

The actual implementation is depending on new financial agreements to be made, as this project was a Strategic Investment Project.

5.2 Extending project team

In the upcoming year the current dedicated project team within Wageningen University should be supplemented with experts in the specific content fields, i.e. waste water treatment, composting, reforestation, tree plantations and horticulture. This would also extend the project to other institutions within Wageningen University & Research, like Wageningen Economic Research and Wageningen Plant Research, as well to partner institutions like Deltares. Besides, the current project team also aims at clear (operational) linkages to relevant and highly related other Knowledge Basis projects, like KB-35-003-001 - Improving food systems in less-favoured areas in East Africa (KB Food and Water security).

5.3 Financial arrangements

The actual implementation of the proposed action is currently still depending on new financial agreements to be made, as this project was a Strategic Investment Project. Potential linkages within existing KB-programming should be explored, as well as new funding opportunities. The aim is to come to self-supporting business models, but in the development phase supportive investments is still needed. The activities can perhaps be supported and go up into other KB-programming or additional programming from other parties, i.e. Ministry of Foreign Affairs could be explored.

5.4 Value creation

The actions carried out and proposed contribute to value creation in different ways. At first, new and broad coalitions are initiated. Secondly, better understanding of needs and opportunities and adaptive capacity of circular systems with societal and environmental relevance and impact has led to actual business propositions, adaptation and uptake of Dutch knowledge into potential circular systems. As such, this supports further development of a potential leadership position for Dutch knowledge, business and practice on this topic. An opportunistic view and actions that make the difference!

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The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 12,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.