De hydrogeoloog in ‘den vreemde’

ACACIA WATER

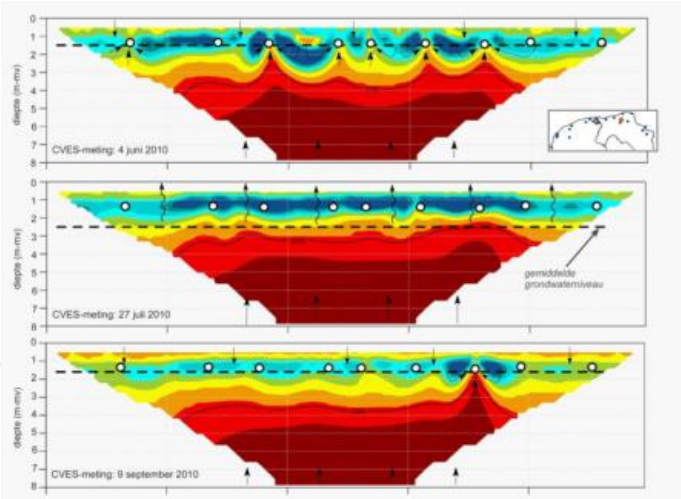
Dr. Arjen de Vries

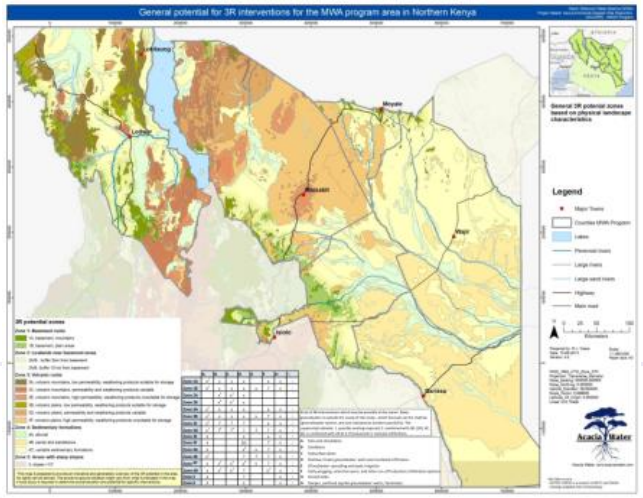
Wie we zijn

2003 : Acacia Institute, VUA
2008 : Start Acacia Water BV, Gouda
Nu: ~20 hydro(geo)logen
50% Nederland en 50% wereldwijd

internationaal

- Grondwater advies diensten; private sector en overheden
- Drinkwater in rurale droge gebieden; NGO’s en overheden





Ethiopia hit by worst drought in decades

The UN says about 8.2m people need emergency food aid in Ethiopia, nearly double the number six months ago.

12 Nov 2015 17:44 GMT | Ethiopia, Weather, Environment, Food

Engagement: 4603

Deadly floods hit Ethiopia

Months of a severe drought broken by heavy rain as torrential downpours develop along the East African Rift Valley.

06 Apr 2016 12:14 GMT | Weather, Africa

Engagement: 274

TOYOTA

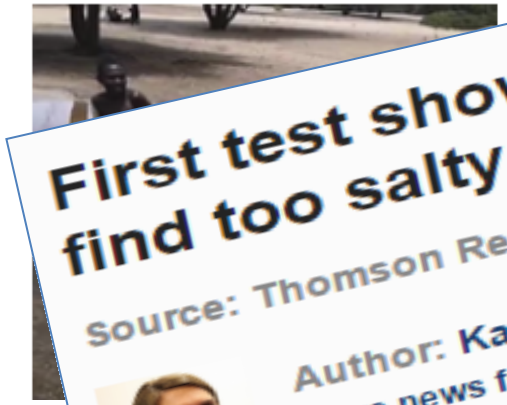
ROUGHT OPERATION 2006

LISTER

Kenia; wat zijn de feiten?

RTI FINDS VAST WATER RESERVES IN DROUGHT-PRONE NORTHERN KENYA, CRADLE OF MAN

September 11, 2013



First test shows Kenya's huge underground water find too salty to drink

Source: Thomson Reuters Foundation - Fri, 27 Feb 2015 15:42 GMT

Author: Katy Migiro and Chris Arsenault

More news from our correspondents

d

...dwate

...has identified

...eserves of water in Turkana County in drought-stricken northern Kenya. The findings were announced at the openi

T... deep groundwater, but little data to support the claimed volumes of available fresh water

Be cautious in claiming large volumes of abstractable water

Wat zijn zoal de uitdagingen?

- Klimaatverandering; meer onregelmatige regenval, overstromingen, verzilting enz.
- Nauwelijks oppervlakte water en diep grondwater
- Gebrek aan infrastructuur
- Toename van vraag; voedselzekerheid
- Zwak waterbeheer; verdroging, uitputting van natuurlijke opslagcapaciteit, inefficiënt watergebruik
- Gebrek aan capaciteit en kennis van de feiten (percepties)

→ **Verhoogde kwetsbaarheid**

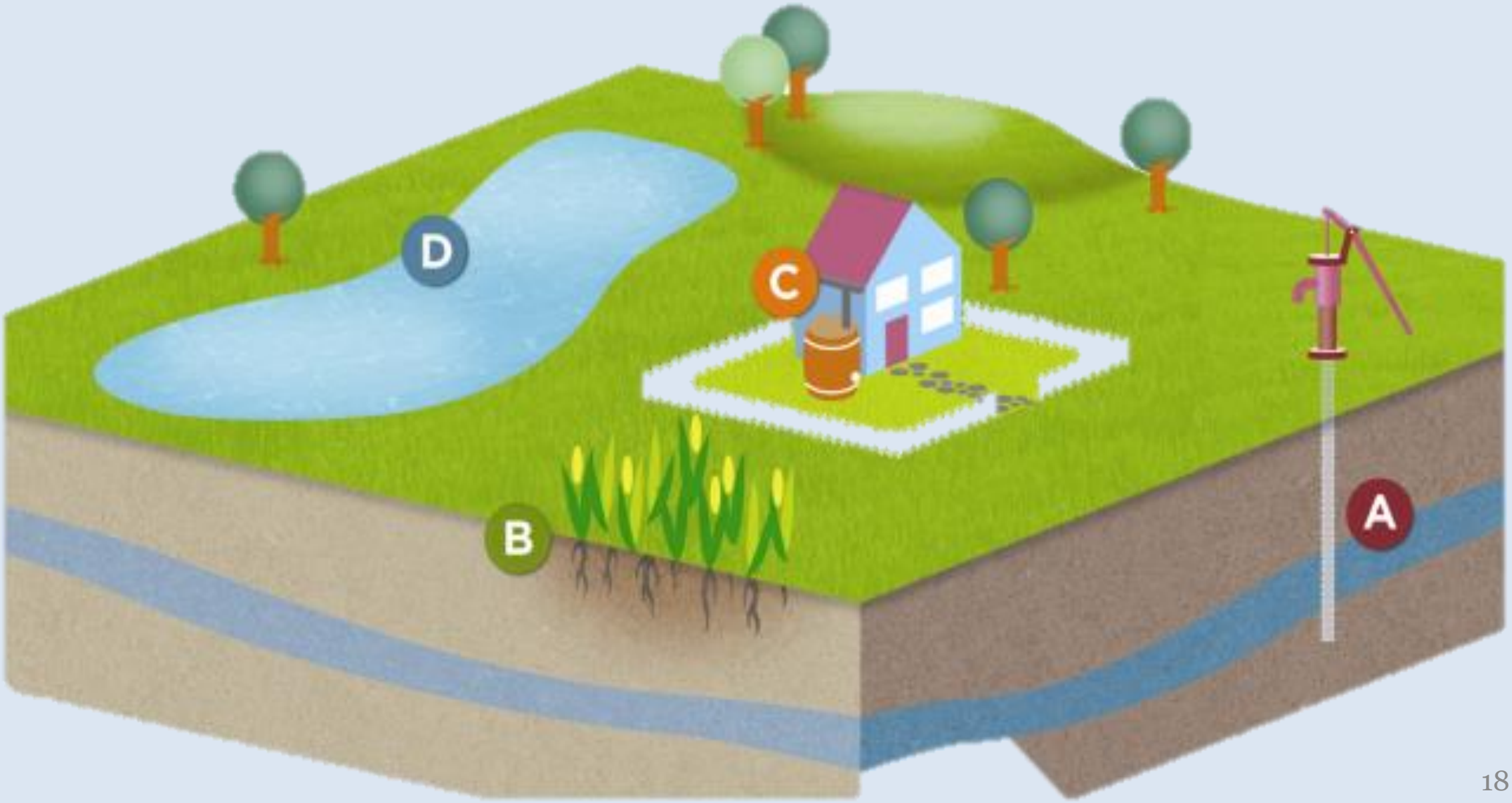
→ **Hoe gaan we om met de uitdagingen**

Wat kunnen we hier aan doen?

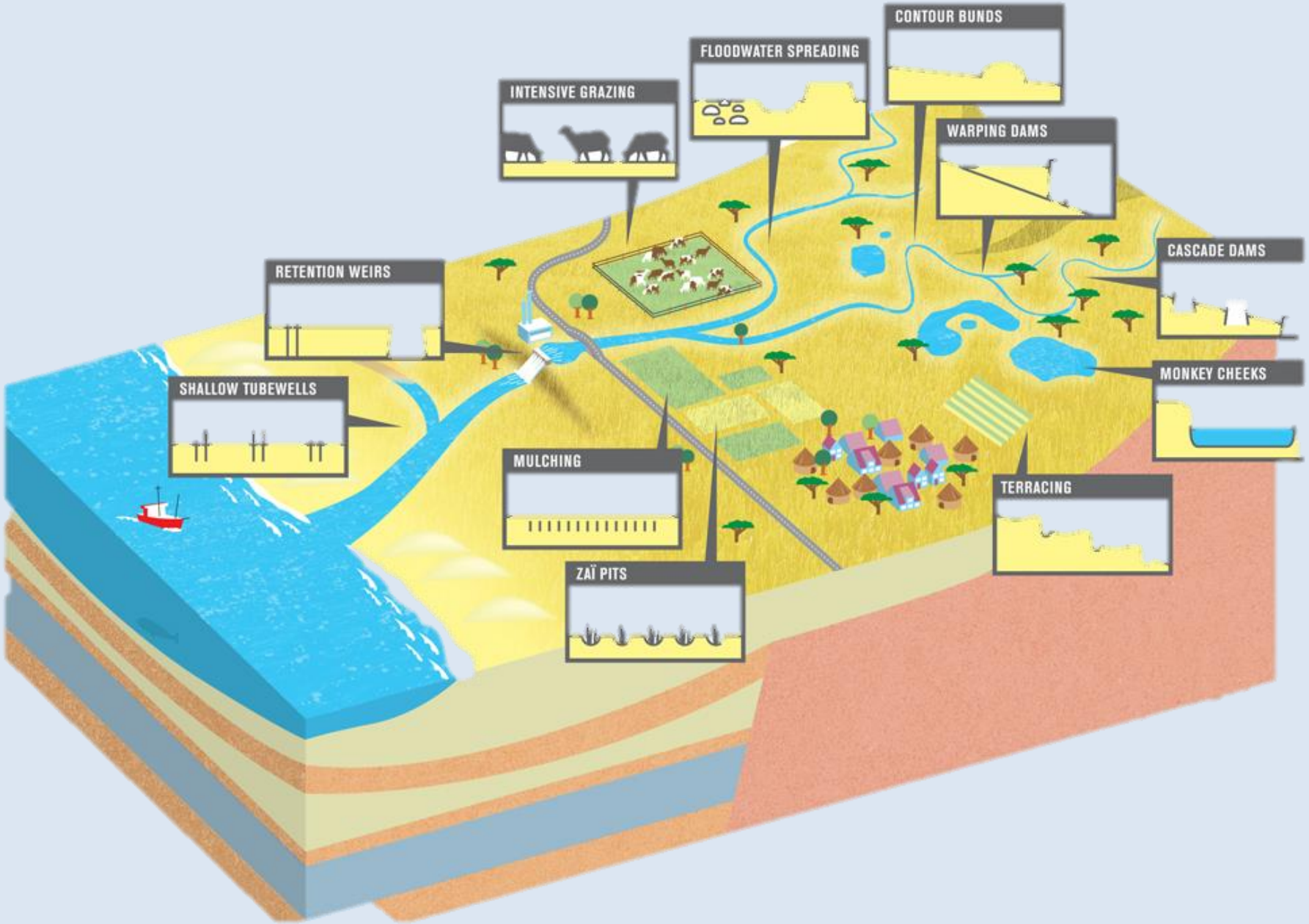
Duurzaam waterbeheer

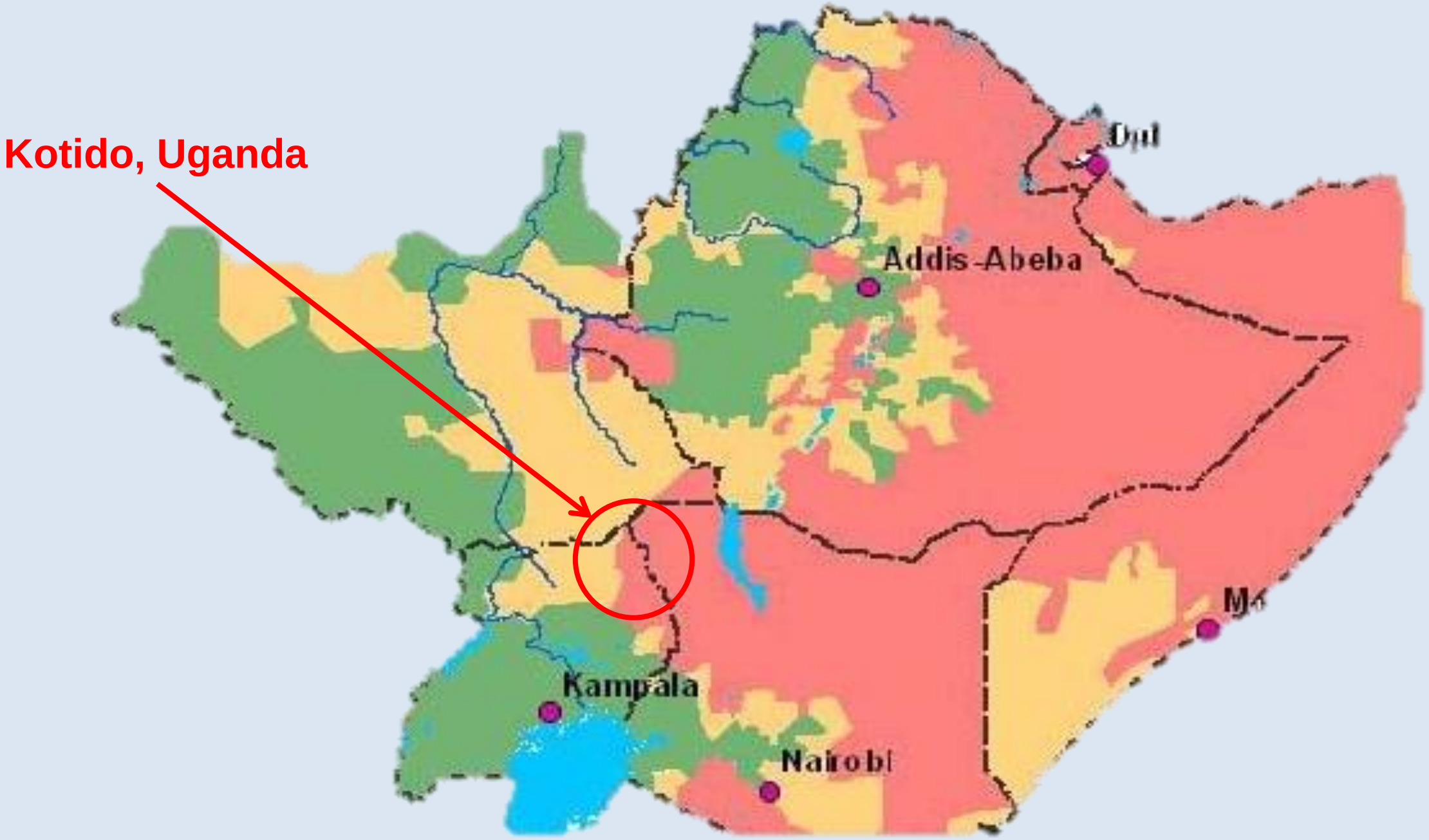
- Creëer een meer robuust natuurlijk en institutioneel landschap middels een geïntegreerde aanpak
- Meer oplossingen op lange termijn; niet alleen op de korte termijn en denk klein en niet alleen groot
- Feiten op tafel; zowel fysieke als ook de sociaaleconomische

Het optimaliseren van de waterbuffer

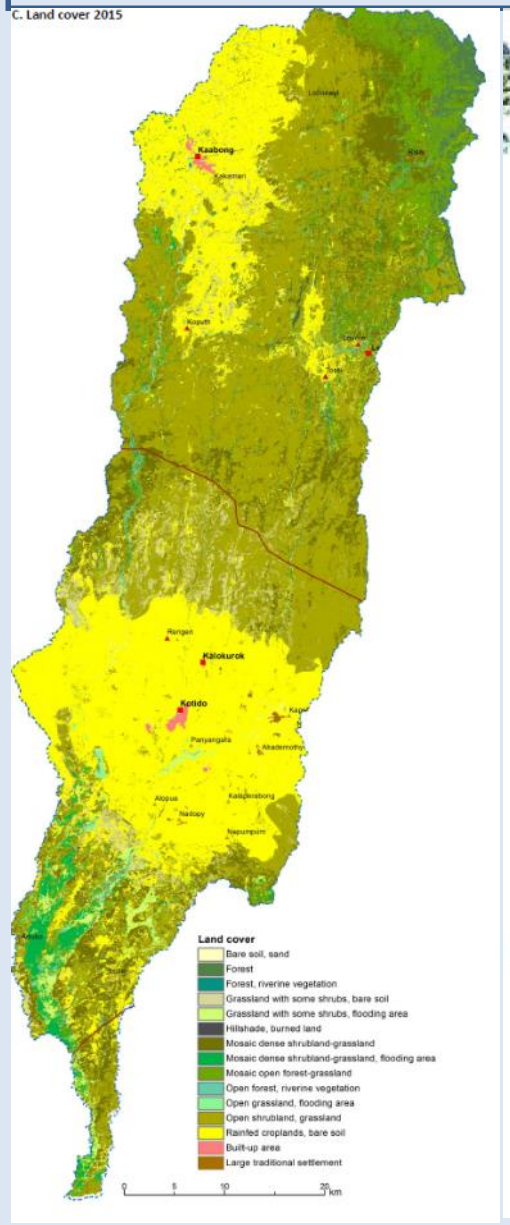


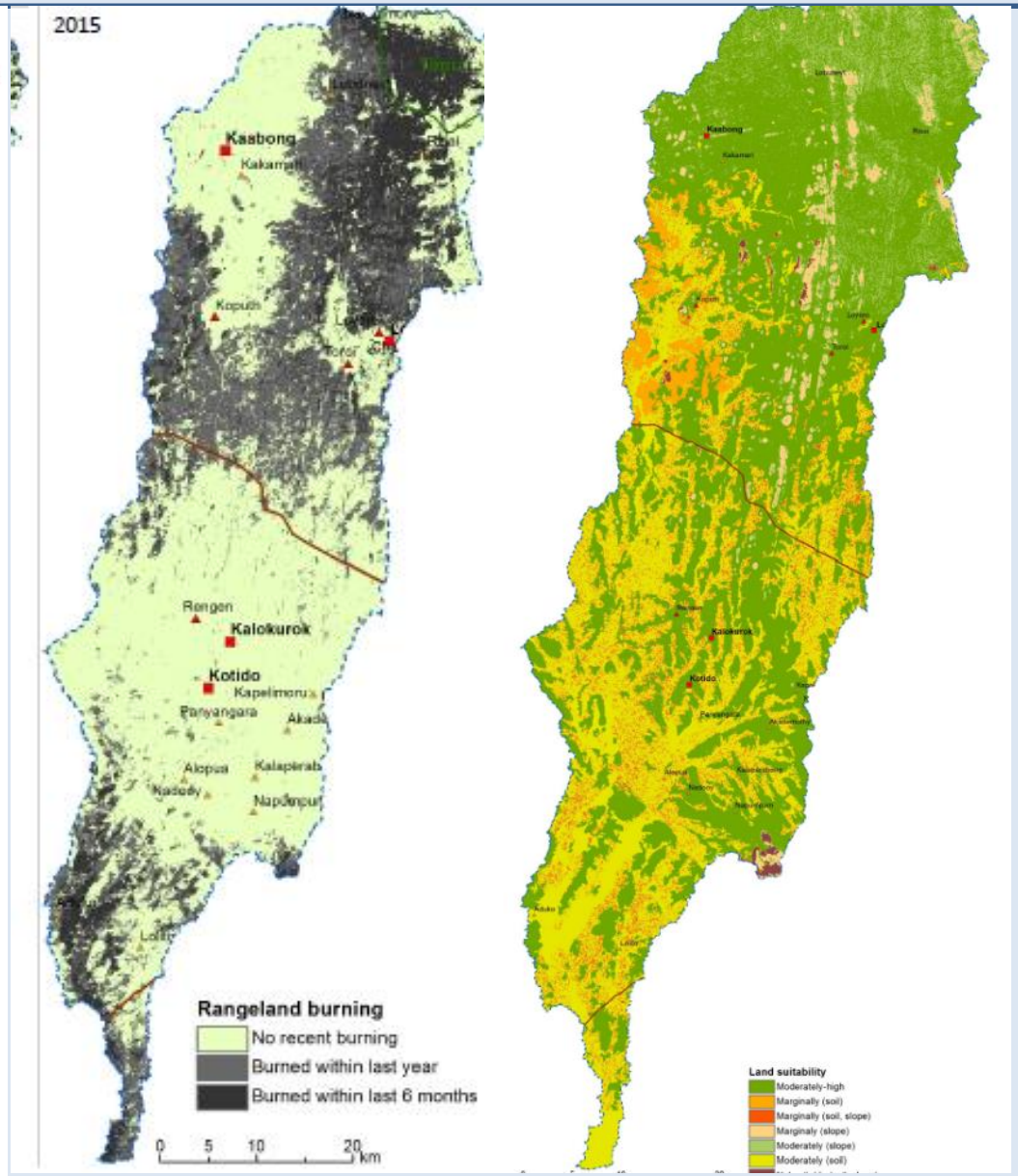
Welke maatregel past waar?




Kotido, Uganda
Djibouti
Addis Abeba
Kampala
Nairobi

De feiten en de opties





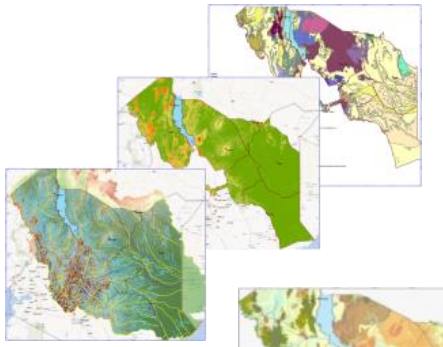
DRAFT

Atlas of the Dopeth Catchment

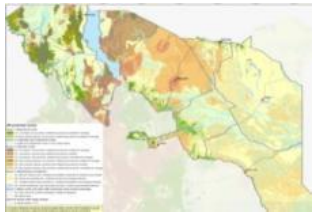
A sociotechnical assessment

Kotido & Kaabong Districts, Karamoja, Uganda

Watershed plan



Physical landscape,
Climate



Water resources and
buffering potential

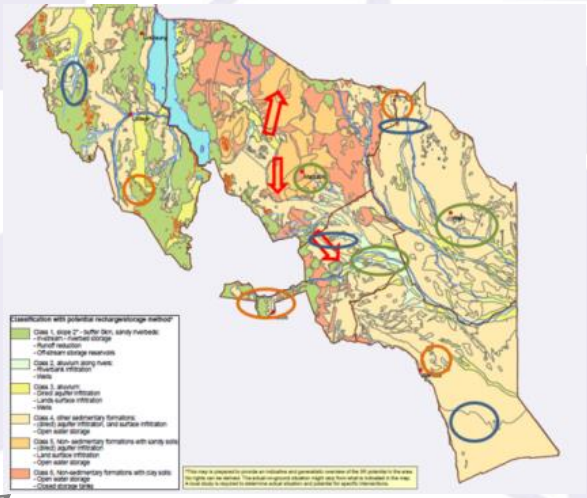
Stakeholder
priorities

Natural resources,
Environmental impact,
Existing water infrastructure

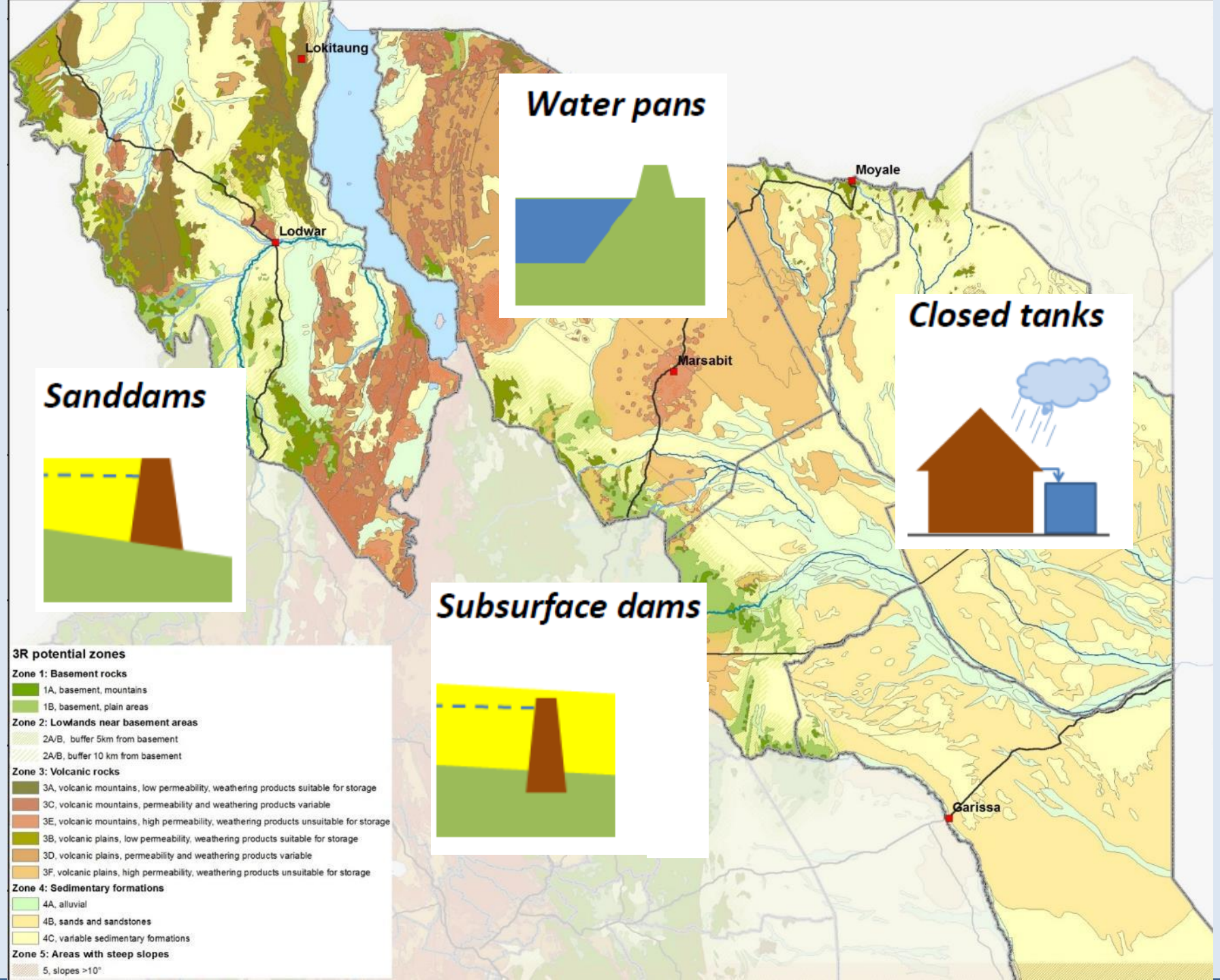
Local knowledge,
Expert judgment

Socio-economical,
cultural & political
context

Priorities & strategies for the water resources development and water buffering



World Agroforestry Centre


Lokitaung
Lodwar
Moyale
Marsabit
Garissa
Water pans
Closed tanks
Sanddams
Subsurface dams
3R potential zones
Zone 1: Basement rocks
1A, basement, mountains
1B, basement, plain areas
Zone 2: Lowlands near basement areas
2A/B, buffer 5km from basement
2A/B, buffer 10 km from basement
Zone 3: Volcanic rocks
3A, volcanic mountains, low permeability, weathering products suitable for storage
3C, volcanic mountains, permeability and weathering products variable
3E, volcanic mountains, high permeability, weathering products unsuitable for storage
3B, volcanic plains, low permeability, weathering products suitable for storage
3D, volcanic plains, permeability and weathering products variable
3F, volcanic plains, high permeability, weathering products unsuitable for storage
Zone 4: Sedimentary formations
4A, alluvial
4B, sands and sandstones
4C, variable sedimentary formations
Zone 5: Areas with steep slopes
5, slopes >10°

Master plan

MILLENNIUM WATER ALLIANCE

CRS CATHOLIC RELIEF SERVICES

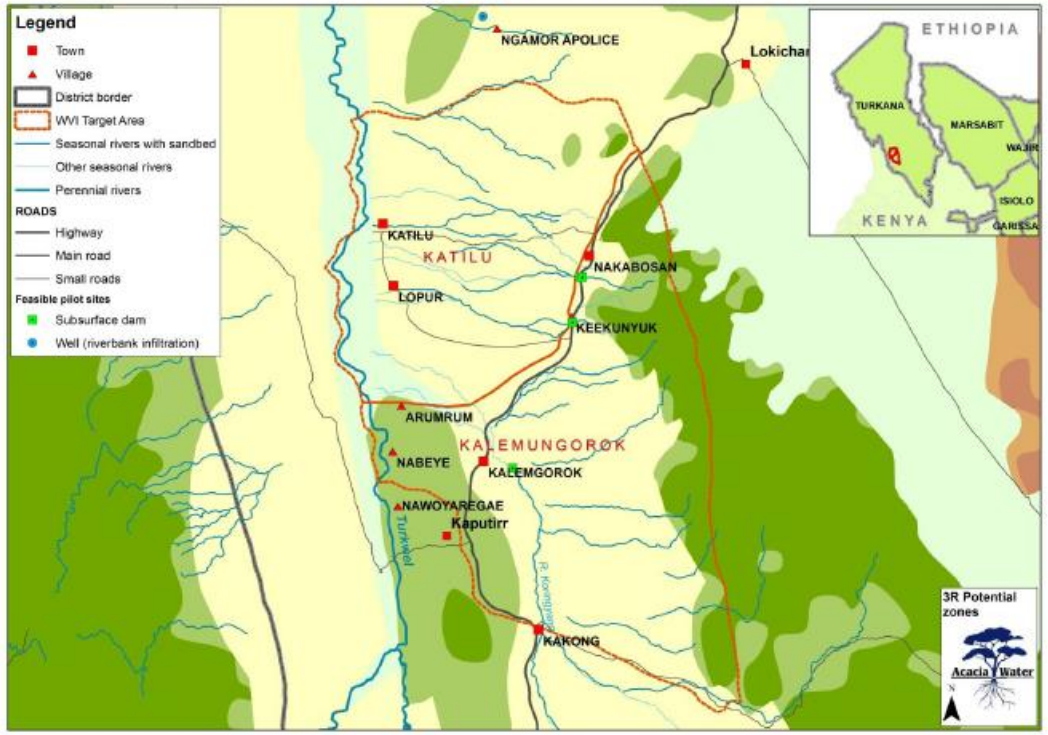
Kenya Arid Lands Disaster Risk Reduction (KALDRR-WASH) program

Water Master Plan Eyrib sub-location, Wajir

- Water infrastructure, including 3R solutions
- Water Governance
- Water management
- Capacity Development

Potential for water buffering

Recharge, Retention and Reuse (3R) in pilot area Kalemngorok-Katilu in Turkana



Rock catchment example

Zone 1A: mountains with high potential for rock catchments combined with a closed tank, sanddams and checkdams.

Sanddam example

Zone 1B: lower slopes of mountains with shallow hardrock and high potential for sanddams, subsurface dams and rock catchments.

Subsurface dam potential

Zone 2: flat or gentle sloping areas near zone 1, with high potential for subsurface dams funded on a clay or hard rock layer, shallow wells and water pans.

Turkwel River

Zone 4A: flat areas with river sediments, with high potential for direct river abstraction, riverbank infiltration and shallow wells. Spate irrigation can be used to increase groundwater recharge.

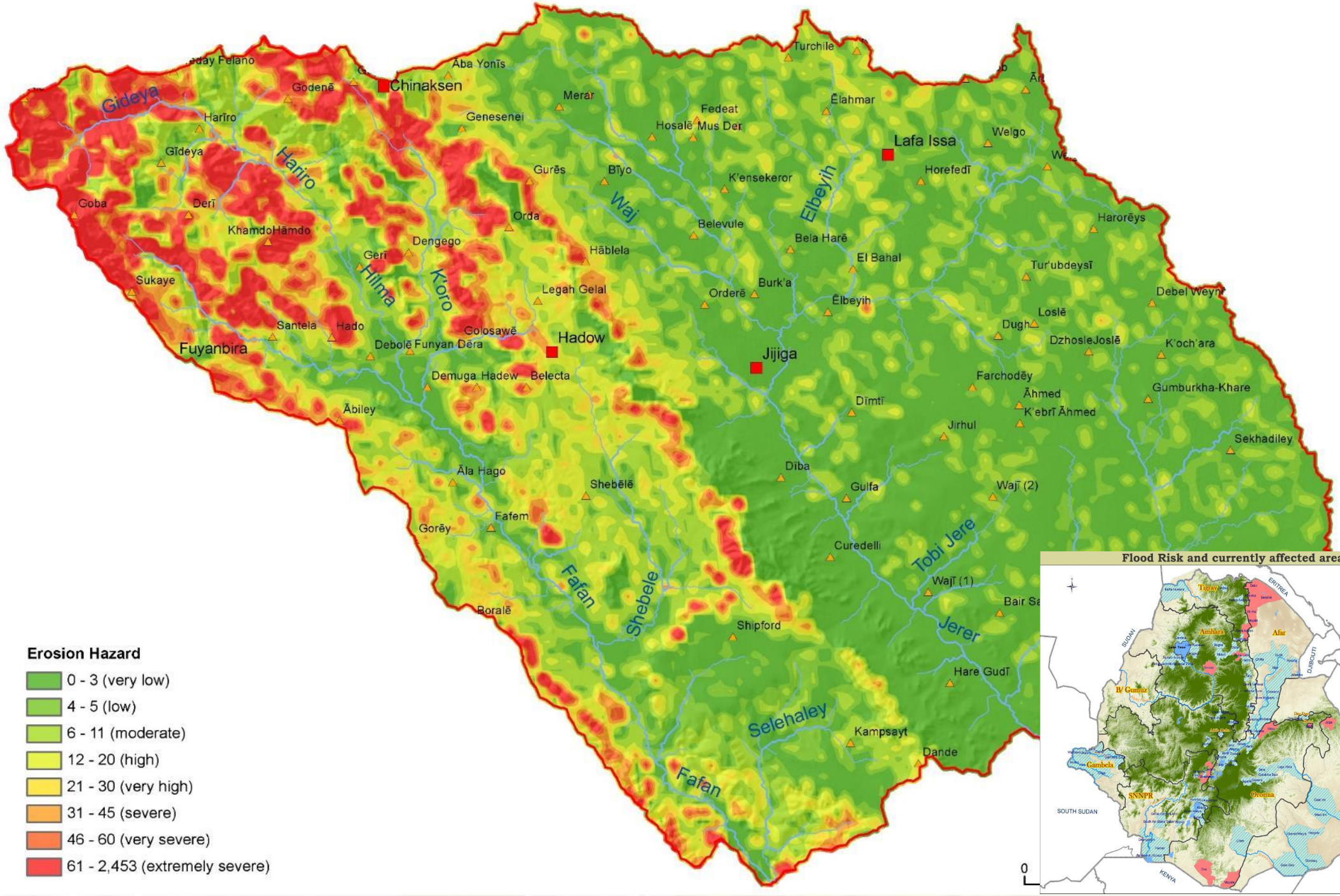
Water resources in the pilot area - The intense seasonal rainfall creates flash floods flowing through the seasonal rivers towards the Turkwel River. Most (surface) water disappears within a short period after the rainy season. The deep groundwater resources in the area become increasingly saline due to over abstraction and/or reduced recharge.

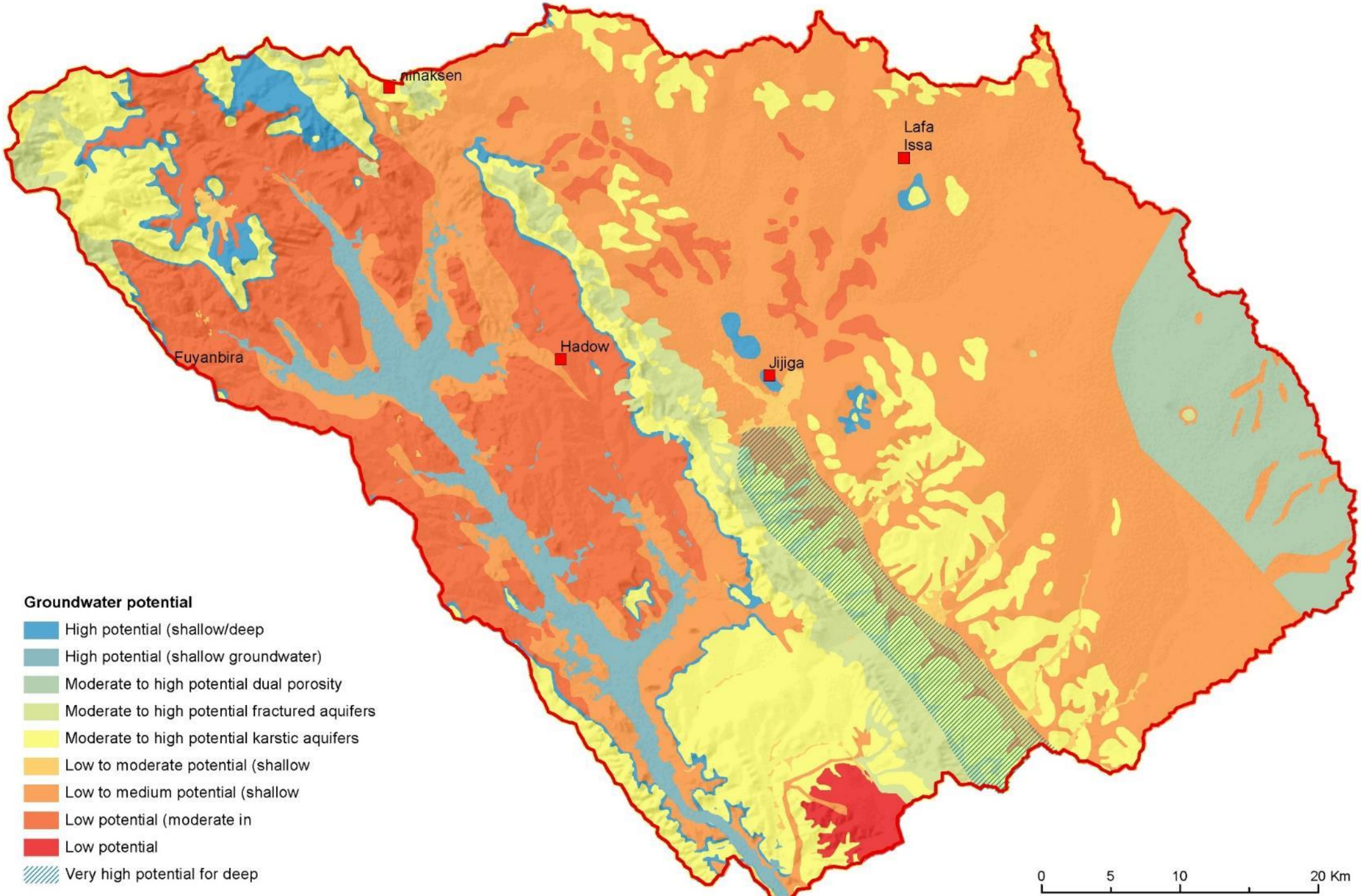
The importance of buffering - Buffering runoff water could solve the water resource problems in the area. The many sandy riverbeds provide a great opportunity for sanddams and subsurface dams. The latter can store large volumes of water, while construction can be done with local materials and community labor.

3R potential - The map provides an indication of the kind of 3R interventions with potential in the zones. Note that implementation of multiple interventions in one river will increase the efficiency.

The factsheets are based on the 3R-MUS study and part of the KALDRR-WASH program, more information is provided in the project reports (website).

MILLENNIUM WATER ALLIANCE IRC water for all Acacia Water


Erosion Hazard
0 - 3 (very low)
4 - 5 (low)
6 - 11 (moderate)
12 - 20 (high)
21 - 30 (very high)
31 - 45 (severe)
46 - 60 (very severe)
61 - 2,453 (extremely severe)
Chinaksen
Lafa Issa
Hadow
Jijiga
Fuyanbira
Gideya
Harīro
Hariro
Hilma
K'oro
Waj
Elbeyih
Fafan
Shebele
Tobi Jere
Jerer
Selehaley
Turchile
Āba Yonīs
Godenē
Merar
Genesenei
Fedeat
Hosalē
Mus Der
Ēlahmar
Welgo
Horefedī
Gīdeya
Gurēs
Bīyo
K'ensekeror
Goba
Derī
Orda
Belevule
Harorēys
KhamdoHāmdo
Dengego
Bela Harē
Hāblela
El Bahal
Tur'ubdeysī
Geri
Sukaye
Legah Gelal
Burk'a
Orderē
Ēlbeyih
Debel Weyne
Loslē
Santela
Hado
Dugh
Debolē
Funyan Dēra
Golosawē
DzhosleJoslē
K'och'ara
Demuga
Hadew
Belecta
Farchodēy
Āhmed
K'ebrī Āhmed
Gumburkha-Khare
Dīmtī
Ābiley
Jirhul
Sekhadiley
Āla Hago
Shebēlē
Dība
Gulfa
Wajī (2)
Fafem
Gorēy
Curedelli
Wajī (1)
Bair Sa
Boralē
Shipford
Hare Gudī
Kampsayt
Dande
Flood Risk and currently affected areas April, 2016
Rivers
Main rivers
Perenial rivers
Lake
Administrative Boundaries
International Boundary
Region
Flood affected areas
Flood risk Areas
Elevation(m)
High : 4517
Low : -236
ERITREA
SUDAN
DJIBOUTI
SOUTH SUDAN
SOMALIA
KENYA
Tigray
Amhara
Afar
B/ Gumuz
Gambela
SNNPR
Oromia
Somali


ninaksen
Lafa
Issa
Hadow
Jijiga
Fuyanbira
Groundwater potential
High potential (shallow/deep
High potential (shallow groundwater)
Moderate to high potential dual porosity
Moderate to high potential fractured aquifers
Moderate to high potential karstic aquifers
Low to moderate potential (shallow
Low to medium potential (shallow
Low potential (moderate in
Low potential
Very high potential for deep
0
5
10
20 Km

DRAFT

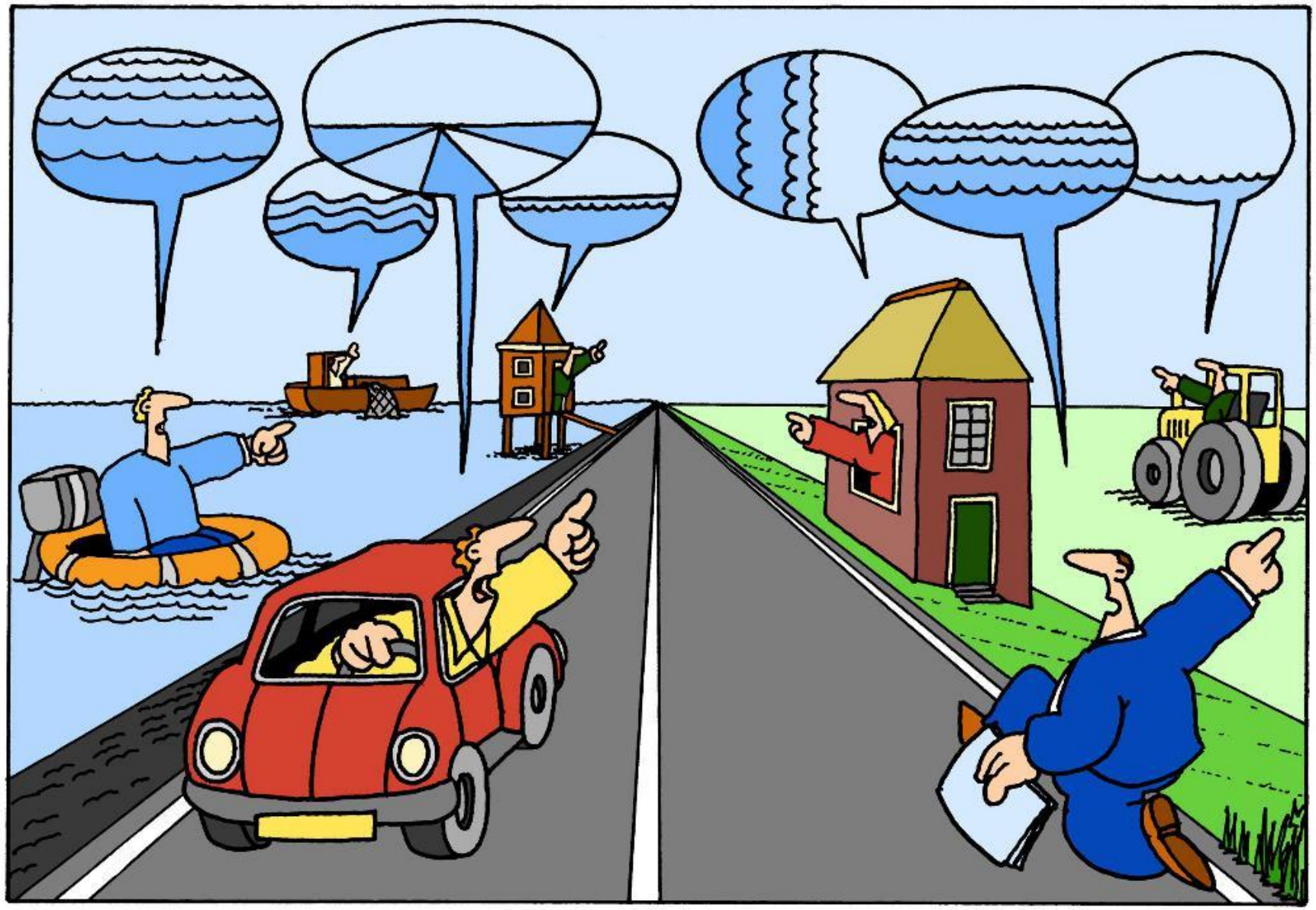
Atlas of the Upper Fafan Catchment

An assessment toward building resilience through ecosystem restoration

Success factoren

naast natuurlijk een degelijk inhoudelijk verhaal

- Socio-ec
- Institutio
- Political
- Cultural
- Technica
- …



Het gesprek met de boer!

Lokale kennis!

Hands on attitude

Internationale
samenwerking!

Lokaal bewijs

In conclusie

We moeten toe naar een rationeler waterbeheer gericht op een veranderd fysisch en sociaal systeem, waarbij lokale oplossingen cruciaal zijn

1. **Hiërarchisch reductionisme:** Inzichtelijk en hanteerbaar maken van het probleem
2. **Meekoppelkansen:** Combineren van lokale en korte termijn belangen van gebruikers met het op regionale en lange termijn gerichte beleid van bestuurders
3. **Massa is kassa:** Kleinschalige maatregelen zodanig structureren dat het leidt tot een grootschalige probleemoplossing
4. **Maatwerk:** Oplossingsrichtingen en strategieën differentiëren naar regionale verscheidenheid

Dank u