# Pesticide Risk Reduction Programme – Ethiopia

# Protection goals sw and gw combined with scenario zones, crops and types of farming

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joint collaborative programme on pesticide registration and post-registration



**MoA**

ALTERRA



# Towards a sustainable use of pesticides in Africa

# Protection goals, etc



Outline

- Surface water protection goals: definition+priority

- Groundwater protection goals: definition+priority

- Types of farming in scenario zones

- Association of crops to scenario zones

- Outline + Results/remaining questions scenario selection procedure (Mechteld)

- Missing information sw:
  # details temporary pond scenario
  # association of crops to sw protection goals (temporay pond and small rivers) plus crop data
  # distance crop-edge of water for temporary pond

# Definition of protection goals
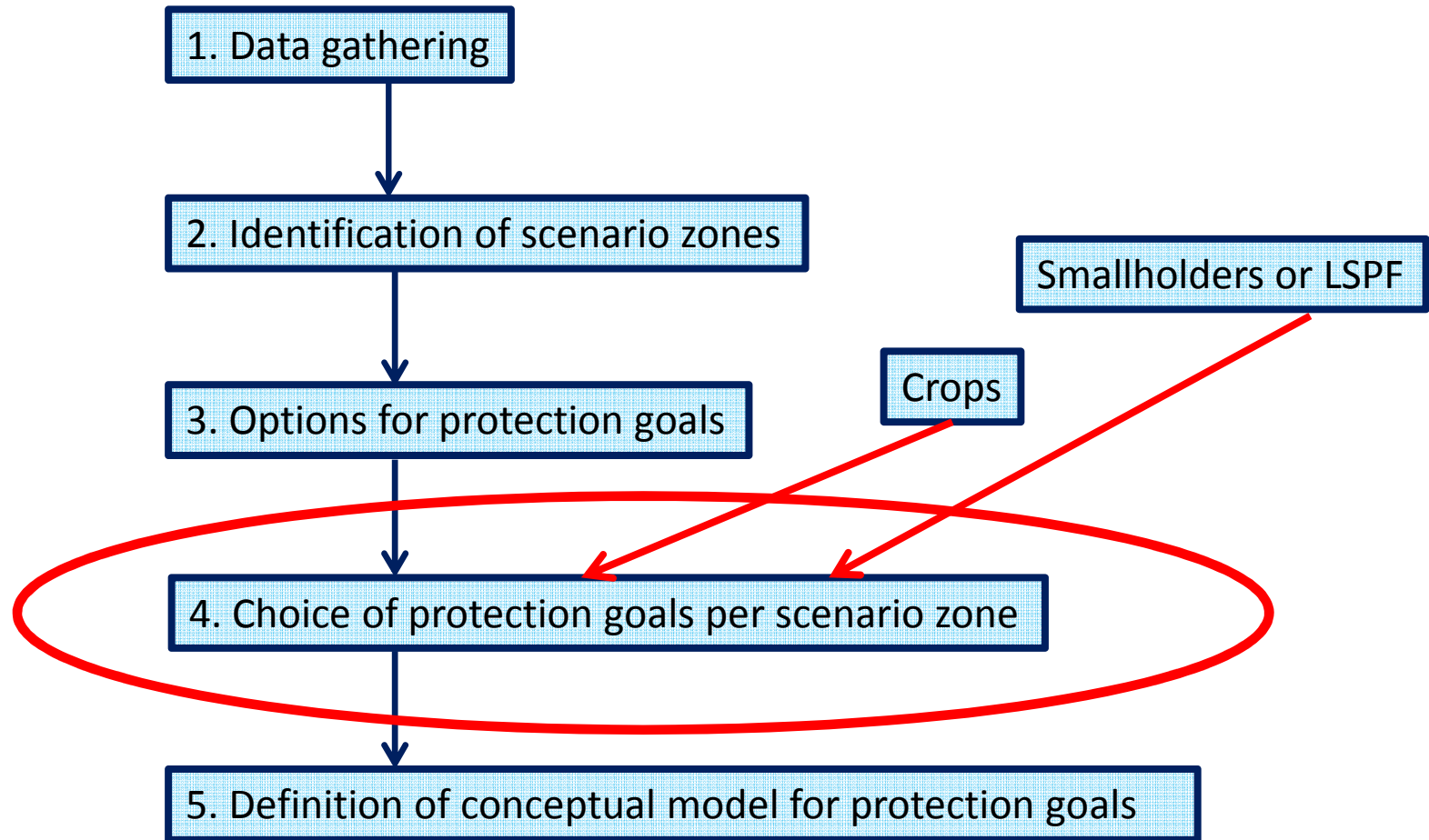
# Protection goals: surface water

- We need set priorities, so limit number of protection goals for which we can work out the scenarios

- Proposal: take 2 most vulnerable goals, i.e. where we expect the highest concentrations
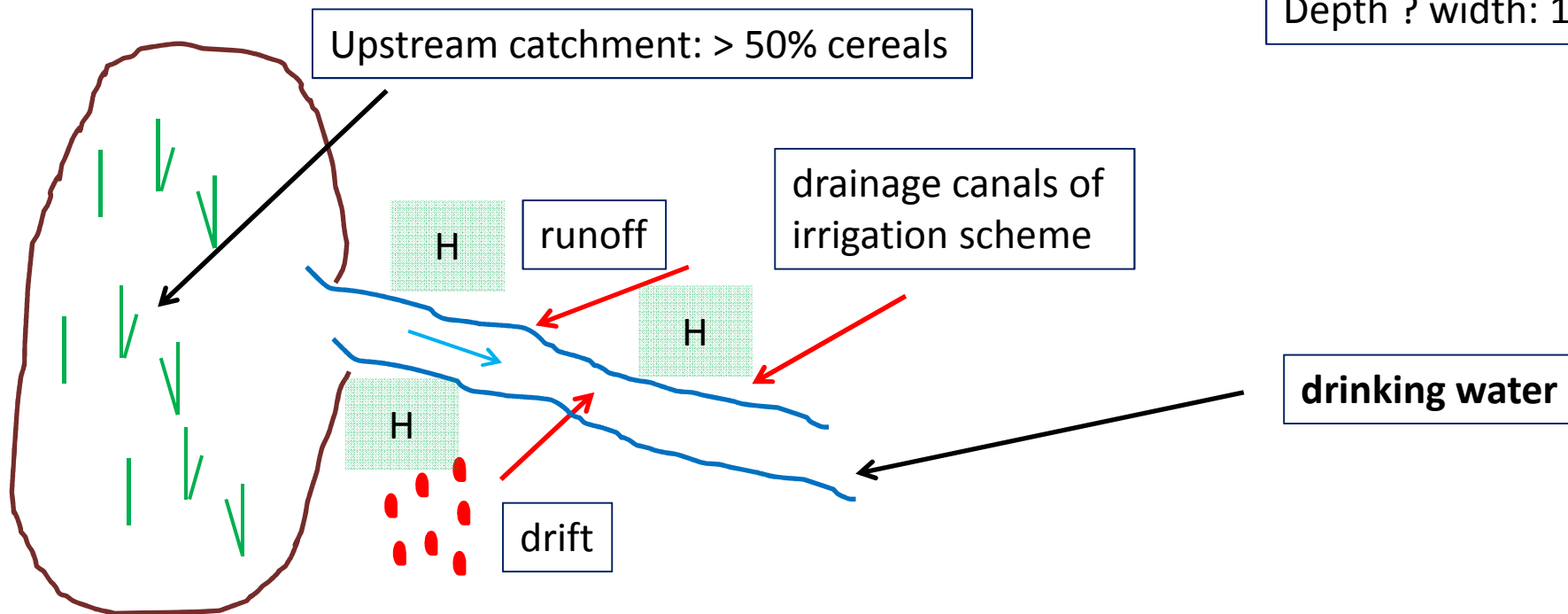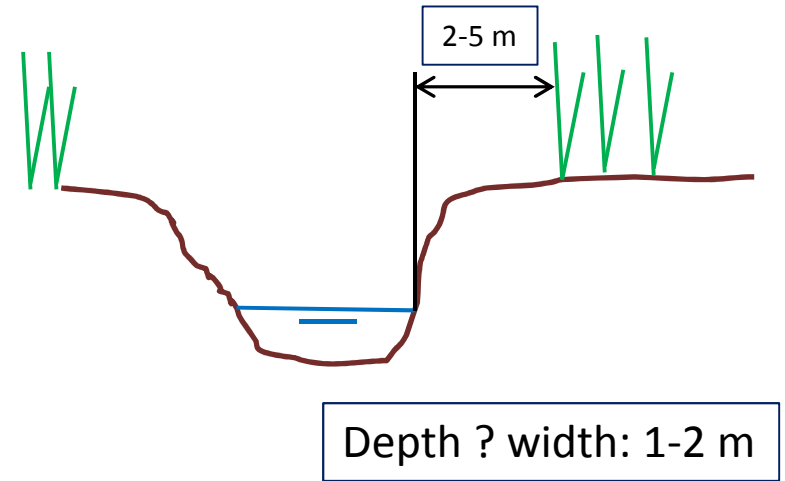
Proposal
1. River type: stream/small river near villages, #3
   entire Ethiopia (most vulnerable+widespread)
2. Pond/lake  type: temporary pond, #2 (cattle drinking)
   Rift Valley, east Ethiopia (also vulnerable)
3. (Rift Valley lakes: used when groundwater unsuitable for drinking water, less vulnerable because of size)

# Protection goals #1: surface water

## 3. Stream/small rivers
- Drinking water (villages) until depleted (just before Kiremt, horticulture still done)
- Drinking water for cattle
- Irrigation of horticulture (H)

2-5 m

Depth ? width: 1-2 m

Upstream catchment: > 50% cereals

H

runoff

drainage canals of irrigation scheme
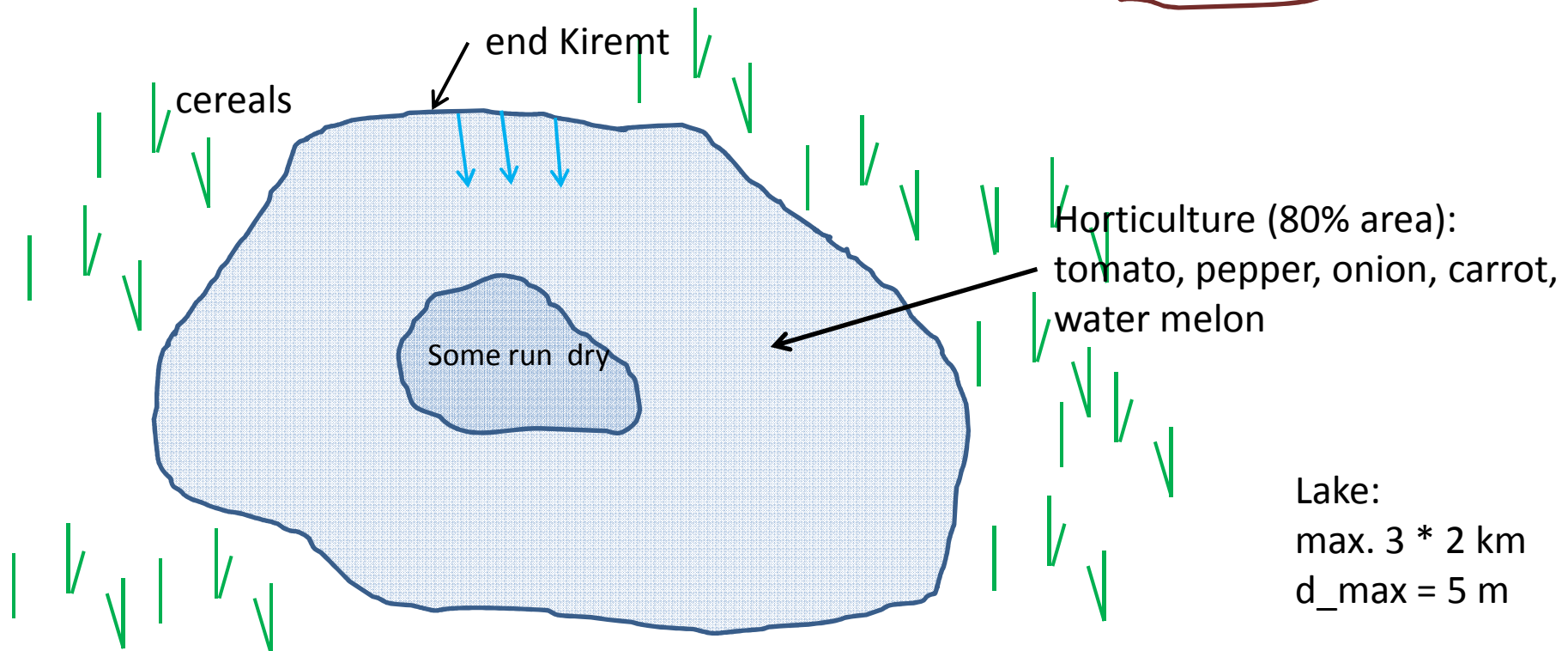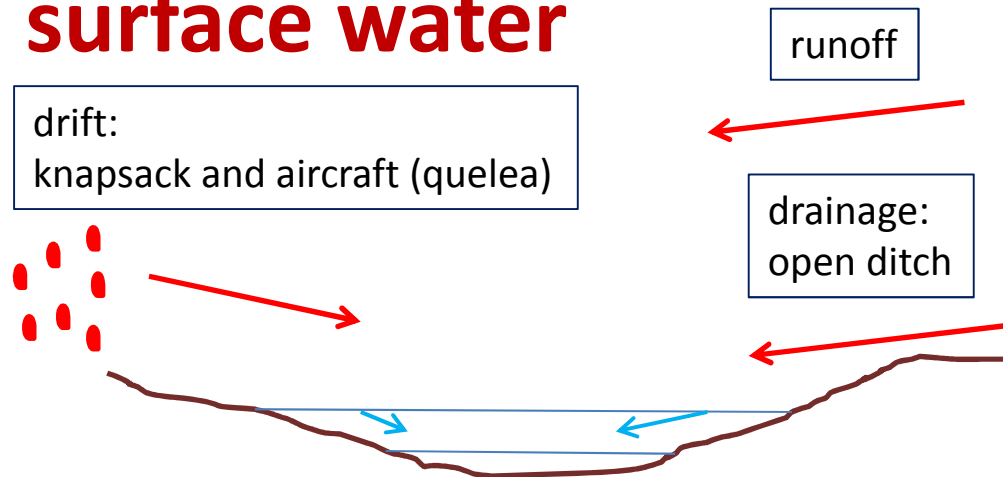
H

drinking water

H

drift

# Protection goals #2: surface water

2. Temporary lakes/ponds/swamp

Koka area,
southern areas: sand filters->men drinking

- Drinking water for cattle (until dry)
- Horticulture (irrigation with pumps)

- Start after Kiremt rains until dried up
- E.g. Koka area (swamp),
  in Rift Valley

runoff

drift:
knapsack and aircraft (quelea)

drainage:
open ditch

end Kiremt

cereals

Some run dry

Horticulture (80% area):
tomato, pepper, onion, carrot,
water melon

Lake:
max. 3 * 2 km
d_max = 5 m

# Protection goals #3: surface water

## 1. Rift Valley lakes

- Drinking water for man and cattle

- E.g. lake Ziway,
  lake Nagano,
  select smallest lake

drift:
knapsack and aircraft (birds)

runoff

drainage:
open ditch
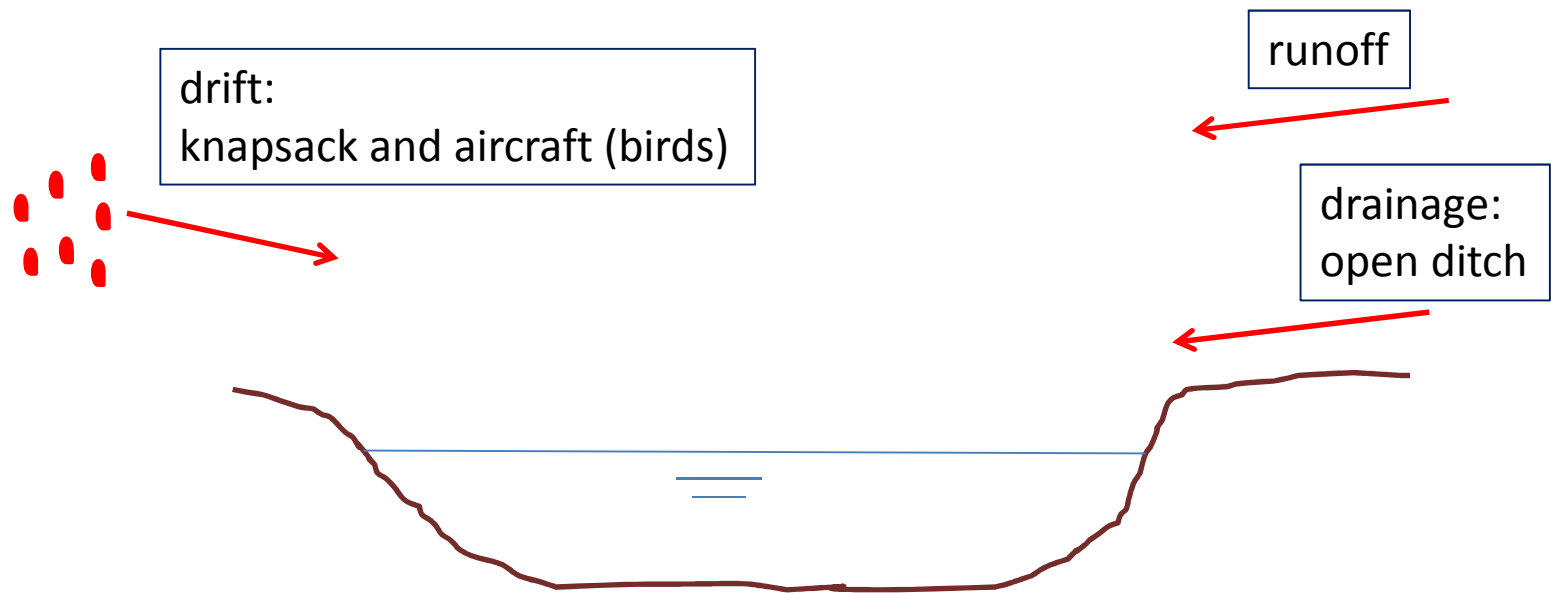
# Protection goals sw in scenario zones

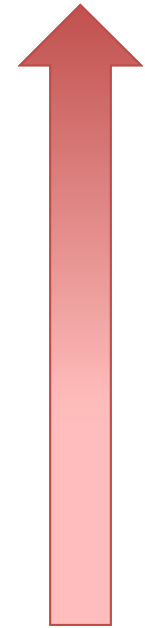most vulnerable

#1 Small river:
  occurs only in scen zone >1500 m


#2 Temporary pond occurs both in
  scen zone >1500 m (but <2000 m) and
  scen zone < 1500 m (but >500 mm rain)

# Protection goals#1:  groundwater

Alluvial aquifers along small rivers (diverging rivers, highlands)


Hand dug wells, min 3 m deep, average 15 m deep

Top layer is clay

Water infiltrates from soils above with mainly cereal production

Gentle slopes

General there is water in well, esp. if rain is high and geological formation favourable

Close to gw #2 (some km)

# Protection goals#2:  groundwater

Volcanic aquifers of shallow wells

Drilled wells, min depth 50 m, up to 100 m deep

Clay layer on top

Water from above fractured volcanic rocks, either barren (bushes), or cultivated: then often terraced (otherwise erosion) with pesticide use. Cereals dominate, some pulses (faba bean)

Can be flat land, steep slopes, but gw is deep or population is high (therefore deeper)

Close to gw#1 (some km)

# Protection goals#3:  groundwater

Alluvial aquifers at the Rift Valley margins or lowlands

Most vulnerable are shallow wells (3 m, hand drilled), then near surface water. (Depth from artesian to 230 m)
Top layer of clay.

Water comes from runoff/percolation from hills/mountains, runoff from volcanic rocks, irrigation return water (spate irr)

# Protection goals#4:  groundwater

Fractured basement rocks of shallow wells


Drilled wells, min 10-12 m deep, max 50 m deep,
Fed by runoff from massive basement rocks

If fractured zone thick: water all year round, if thin, dry
from Dec to June. Fractured zone often near small rivers

More arid zones, sorghum, limited teff, so limited
pesticide use, so not so vulnerable

# Protection goals gw in scenario zones

#1 Alluvial aquifers along small rivers:
  occurs only in scen zone >1500 m

#2 Volcanic aquifers of shallow wells:
  occurs only in scen zone >1500 m
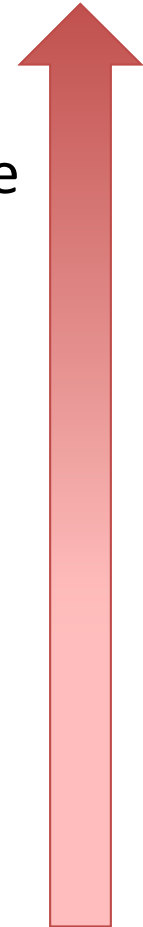#1 and #2 may be close to each other

most vulnerable

#3 Alluvial aquifers at RV margins and lowlands
(map circles around yellow locations, overlain with scen zones):
  occurs mostly in scen zone <1500 m,
  may be in scen zone >1500 m (but then < 2000 m),

#4 Fractured basement rocks of shallow wells
  not considered, less vulnerable

# Types of farming in scenario zones

Smallholders
- these are evenly distributed across scen zone >1500 m,
- these are evenly distributed in zone 1000-1500 m in scen zone < 1500 m


Large Scale Private Farms (LSPFs)
- these occur in both scen zones, irrigated, along major rivers (4, 5 up to max 10 km away)
(dominant < 1500 m because big rivers, flat, fertile alluvial, less >1500 m, may be irrigated, mostly rainfed, mostly cereals)

# Crops in types of farming and scen zones

**Large Scale Private Farms**, LSPFs:

*zone > 1500 m*:
wheat, barley, maize
Also pulses (faba bean, field pea, French bean, chickpea),
coffee, citrus, vegetables (on, tom, pepp, cabb)

*zone < 1500 m*:
sorghum, sesame, French bean (Faseolis vulgaris)
sugarcane, cotton, maize

Also citrus, sweet potato (for planting mat.), vegetables (tom, on, pepp, cabb)

Vegetables are: onions, tomato, pepper, cabbage, French beans

# Crops in types of farming and scen zones

**Smallholders**:

*Zone > 1500 m:*

Teff, maize, wheat, barley, vegetables (all),

Also potato, pulse (faba bean, field pea, French bean, chickpea, lentils), pome/stone fruit,

*Zone < 1500 m (1000-1500 m):*

Teff, maize, wheat, barley, vegetables (all),

Also potato, sweet potato, banana (few pestic), mango

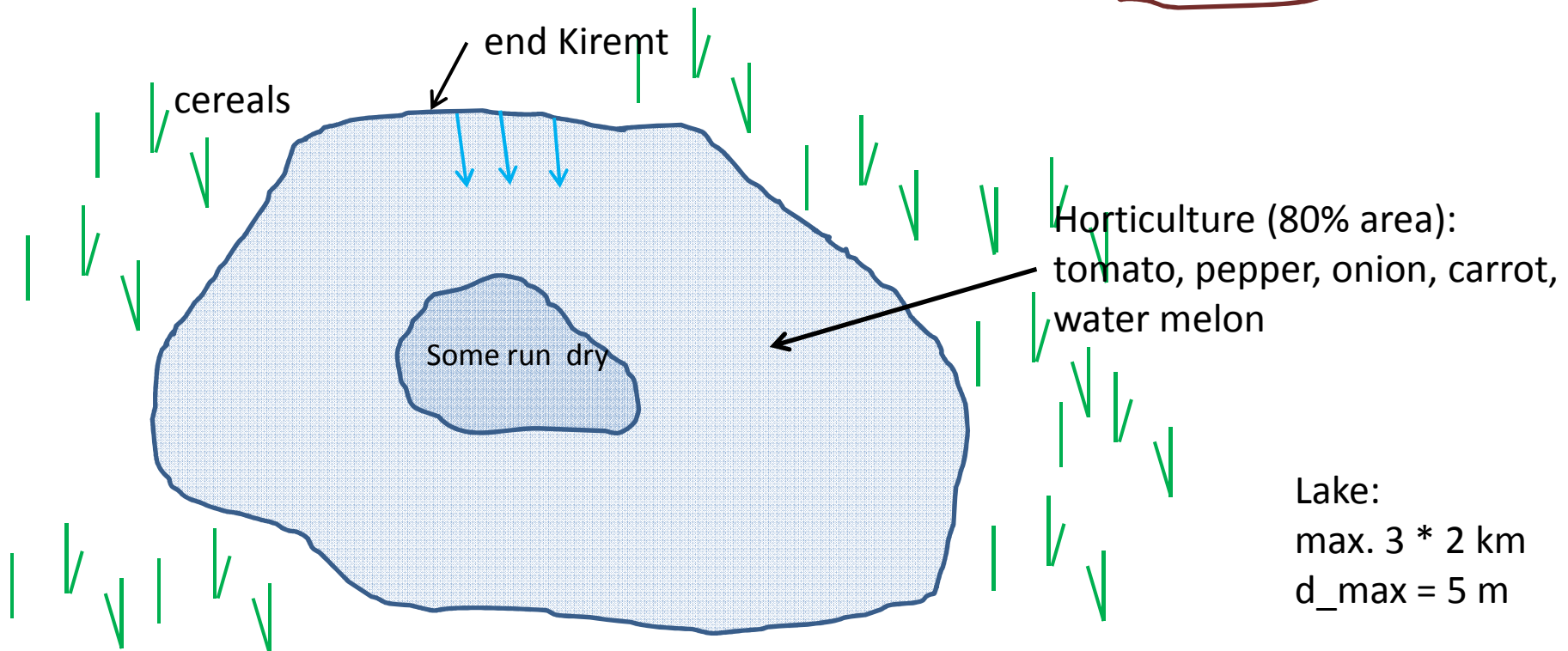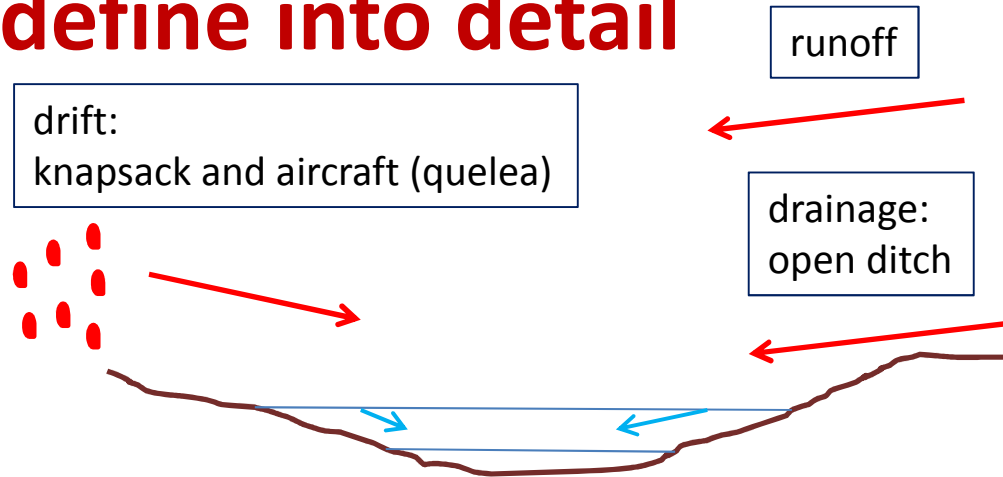Coffee (no pesticides, so not needed)

Vegetables are: onions, tomato, pepper, cabbage, French beans

# Temporary pond to define into detail

2. Temporary lakes/ponds/swamp

Koka area,
southern areas: sand filters->men drinking

- Drinking water for cattle (until dry)
- Horticulture (irrigation with pumps)

- Start after Kiremt rains until dried up
- E.g. Koka area (swamp),
  in Rift Valley

runoff

drift:
knapsack and aircraft (quelea)

drainage:
open ditch

end Kiremt

cereals

Horticulture (80% area):
tomato, pepper, onion, carrot,
water melon

Some run dry

Lake:
max. 3 * 2 km
d_max = 5 m

# Temporary pond to define in detail

Important issues

- Size of pond (end Kremt=Dec up to May, June) ?
- Depth of pond (Dec up to May, June)
- Size of contributing area on which crops are grown and that delivers its runoff into the pond
- Are these crops irrigated ?

(if yes, pb how to simulate this with PRZM ?)

# Temporary pond: crops + crop data (PRZM)

*Both in scen zone >1500 m (but <2000 m) and*
*scen zone < 1500 m (but >500 mm rain)*

Vegetables (tomatoes, onions, pepper, cabbage, French beans)

Other crops ?

Only small holders ?

See Word doc

# Temporary pond: distance crop-edge of water

*Both in scen zone >1500 m (but <2000 m) and*
*scen zone < 1500 m (but >500 mm rain)*

Crops are selection of former list (near temporary pond)

Vegetables (tomatoes, onions, pepper, cabbage, French beans)

Maize ?

Other crops ?

Only small holders ?

# Small rivers: crops + crop data (PRZM)

*Only in scen zone >1500 m*

Crops are selection of former lists (near with small rivers):

Barley, wheat, maize, teff

Pulses

Vegetables (tomatoes, onions, pepper, cabbage, French beans)

Other crops ?

Small holders and LSPF,

See Word doc

# Definition of sw protection goals