Pesticide Risk Reduction Programme – Ethiopia

Definition of protection goals

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joint collaborative programme on pesticide registration and post-registration

MoA

ALTERRA




Towards a sustainable use of pesticides in Africa

Definition of protection goals

Outline

- Introduction to protection goals

- Stepped approach, today and tomorrow focus on:
  - One scenario zone or split Ethiopia in more zones ?
  - Define and describe options for protection goals: select and prioritise
  - Coupling of protection goals to scenario zones
  - Design conceptual models for protection goals

- Needs, tasks to distribute, planning

Definition of protection goals

How to define protection goals into detail ?

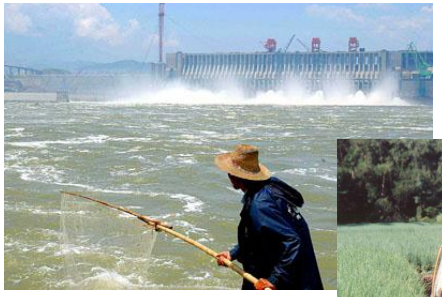
Answer questions:

- What do you want to protect ?
- Where ?
- When and how strict ?

Definition of protection goals

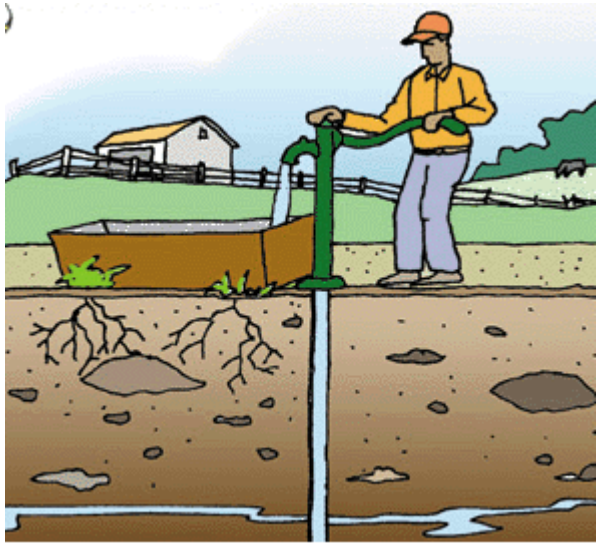
Example protection goal: aquatic ecosystem

- What should be protected ?
  - Which aquatic organisms represent the ecosystem ?
- Where ?
  - Big rivers, lakes or field ditches ?
  - Single watercourse or network of watercourses ?
- When and how strict ?
  - No effects at all or temporary effects are accepted ?



Definition of protection goals

Example protection goal: groundwater



- What should be protected ?
  - Groundwater for drinking water ?
- Where ?
  - Individual abstraction of farmers or public (large scale) abstraction ?
  - At which depth ?
- When and how strict ?
  - Protection on long term or protection against peak concentrations ?
  - Exceedance of standard NOT acceptable or 10% exceedance accepted ?

Definition of protection goals

Example protection goal:

groundwater in the Netherlands

- Principle:
  groundwater must be suitable for large scale drinking water abstraction

- Consequences:
  - Protect entire aquifer (large surface)
  - Over a longer period
  - 10% exceedance of standard is accepted
    (90^{th} percentile)

Definition of protection goals

Why is definition of protection goals important?

If protection goals have been defined into detail

we know which exposure concentrations we need to assess, so
we can design scenarios

Example:

Protection goal for aquatic ecosystem:

no effects are accepted in field ditches

Required exposure scenario:

peak concentration of dissolved pesticide in water of field ditches

Definition of protection goals

What is role political level / risk managers ?:

They have to strike the balance between environment and socio-economic considerations

Example: no effects acceptable for aquatic ecosystem in ditches

Implication: 50% of pesticides currently used in Ethiopia cannot be registered

- minister of environment in Ethiopia ☺
- minister of agriculture in Ethiopia ☹
- farmers ☹
- pesticide industry ☹

So, specification of a protection goal is a political choice !

Definition of protection goals

Therefore:

Political support for selected protection goals is crucial !

In the EU:

- Scientists define options
- Risk managers decide

How to organise this in Ethiopia ? Procedure ?
Point to discuss in break-out groups or central discussion during reporting back ?

Definition of protection goals

Outline

- Introduction to protection goals

- Stepped approach, today and tomorrow focus on:
  - One scenario zone or split Ethiopia in more zones ?
  - Define and describe options for protection goals: select and prioritise
  - Coupling of protection goals to scenario zones
  - Design conceptual models for protection goals

- Needs, tasks to distribute, planning

Definition of protection goals

- Stepped approach
- Focus first on what and where, so the spatial component
- Later focus on when and how strict, the temporal component (workshop criteria in 2012)

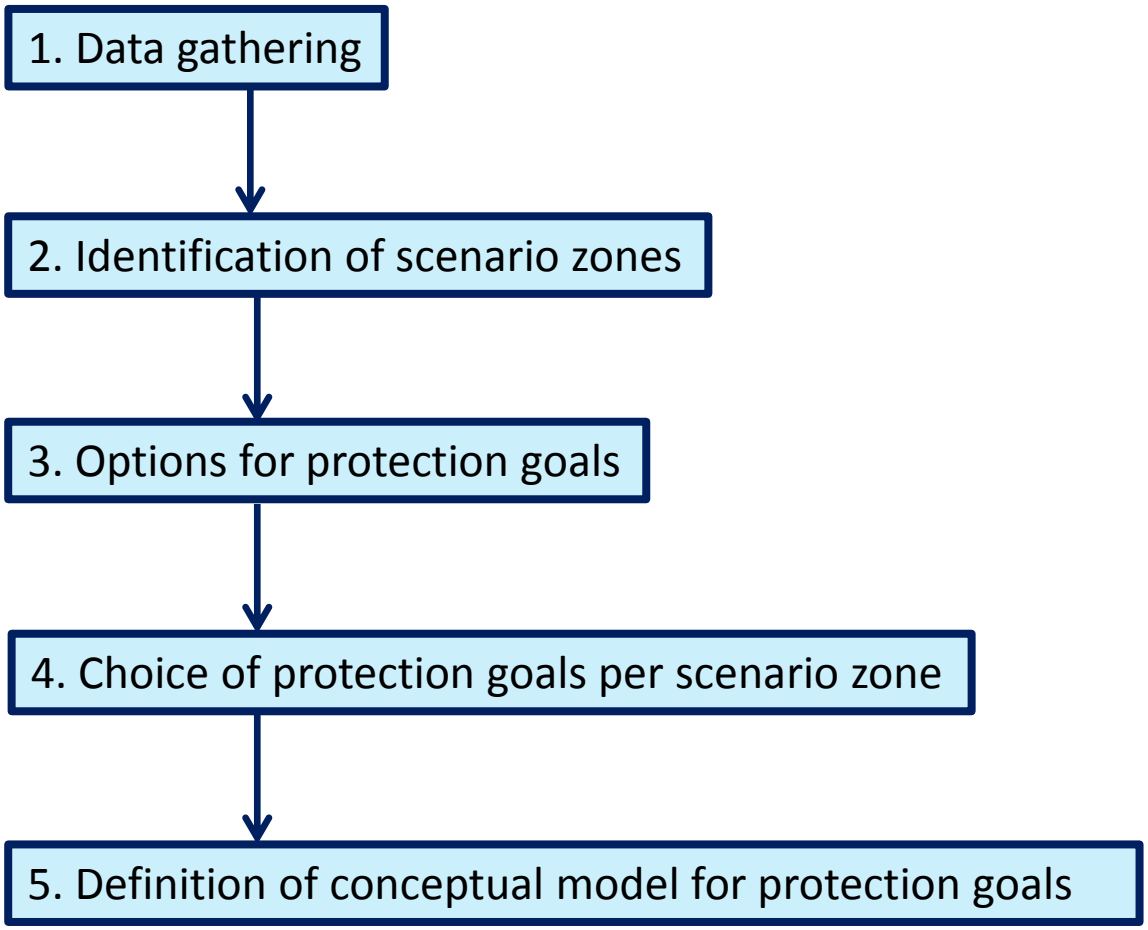
Definition of protection goals

- Stepped approach, steps for this workshop
  - One scenario zone or split Ethiopia in more zones ?
  - Define and describe options for protection goals: select and prioritise
  - Coupling of protection goals to scenario zones
  - Design conceptual models for protection goals

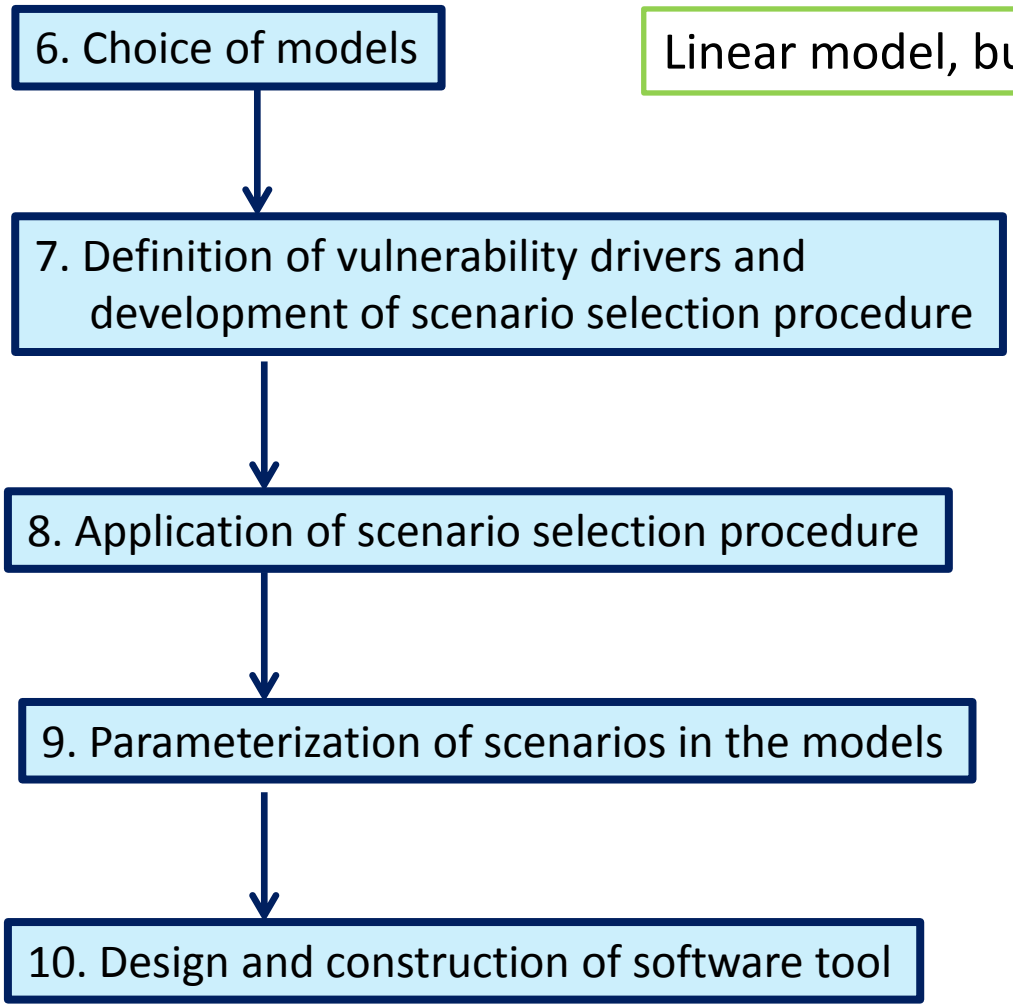
- First, brief explanation of the steps

- Next, three crucial steps treated into more detail today and tomorrow, each time followed by work in break-out groups and a consecutive central discussion

Definition of protection goals



Later: (after definition of protection goals)



Linear model, but loops occur !

Definition of protection goals

1. Data gathering

- For groundwater and surface water systems:
  - Climate
  - Land use
  - Crops
  - Agricultural practices
  - Depth groundwater, catchment size
  - Pesticide use and application techniques

Definition of protection goals

2. Identification of scenario zones

- One scenario covering the entire country or split the country into scenario zones ?

- N.B. Political decision !

- Consequences:
  - One scenario: compound fails: NO registration
  - More scenarios: compound may pass some scenarios and fail some other scenarios: registration in some zones and in other zones no registration or e.g. registration with restrictions,
    -> so more flexibility in registration

Definition of protection goals

3. Options for protection goals

- Definitions of options for protection goals, e.g. drinking water from groundwater, drinking water from surface water, aquatic ecosystem, birds, bees, ...

- What should be protected, where and how strict ?
  Emphasis on what and where, so the spatial component

- N.B. Role for scientists

Definition of protection goals

4. Choice of protection goals per scenario zone

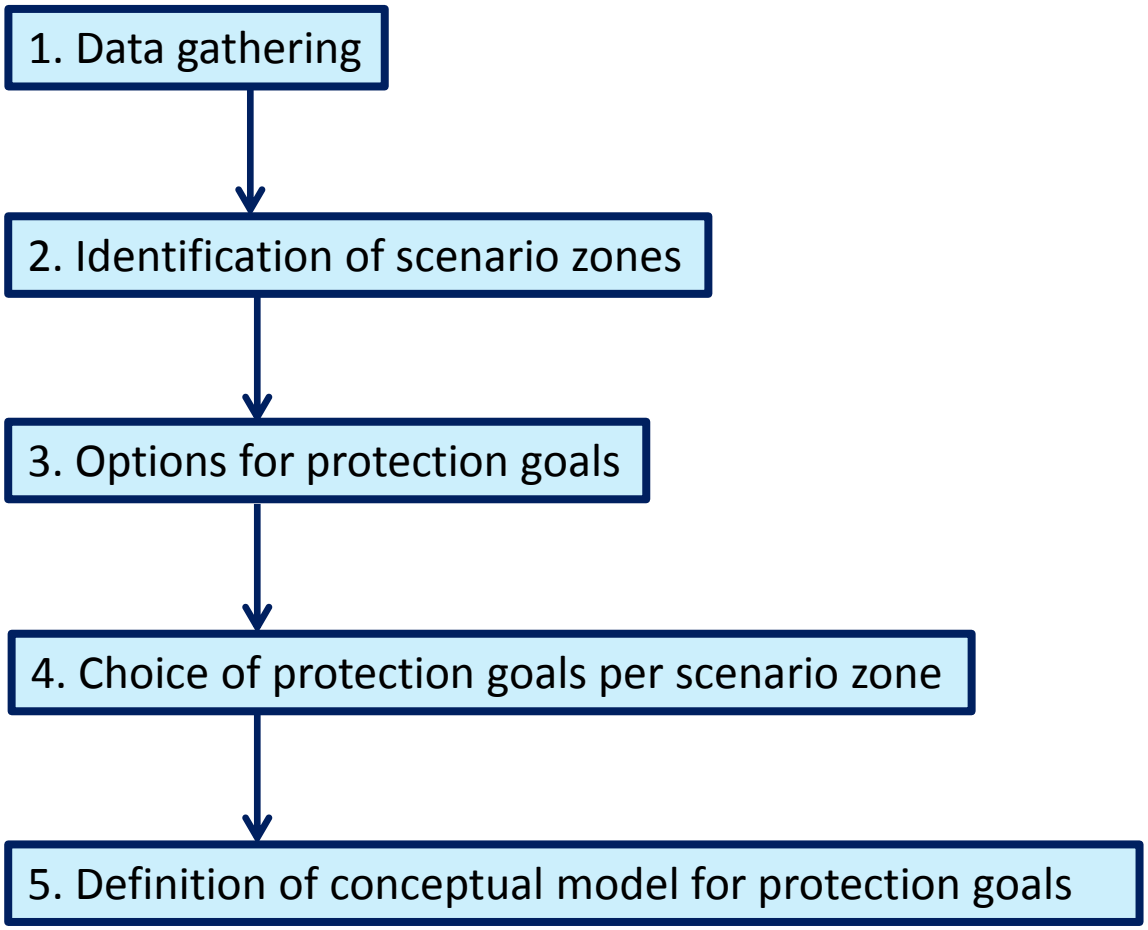
- Policy makers select protection goals
- Listing validity of protection goals for scenario zones
- If necessary: policy makers set priorities in operationalizing the protection goals

Definition of protection goals

5. Definition of conceptual model for protection goals

- Define conceptual model for each protection goal:
  - Lay out scenario: e.g. catchment size, size adjacent field to surface water, surrounding fields, size surface water body
  - Entry routes of pesticides
  - Farm types (smallholders or large-scale investment farming)
  - Application techniques used
  - Relevant crops
  - Relevant pesticide processes

Definition of protection goals: steps in detail



Definition of protection goals: steps in detail

1. Data gathering

- Inventory study gathered already many data on agro-environmental conditions and pesticide use

- After steps 2-5
  - Further detailing needed, how ?
  - Additional data needed, what exactly ?
  - Planning

- Identification of actors needed: Who will gather and manipulate data in Ethiopia (including Geographical Information) ?

Definition of protection goals: steps in detail

2. Identification of scenario zones

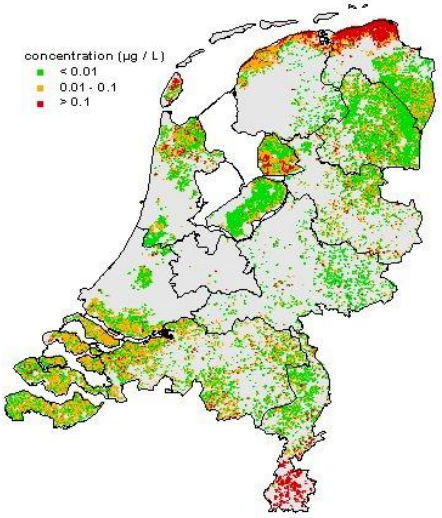
- One scenario covering the entire country or split the country into scenario zones ?
- Political decision: Who ?

- Consequences:
  - One scenario, representing ‘realistic worst case’ situation, so scenario will be more strict than average situation (often 90th%-ile):
    if compound fails: NO registration
  - More scenarios, each ‘realistic worst case’ for scenario zone:
    compound may pass some scenarios and fail some other scenarios:
    registration in some zones and in other zones no registration or e.g. registration with restrictions,
    -> so more flexibility in registration, but more difficult to uphold

Definition of protection goals: steps in detail

2. Identification of scenario zones

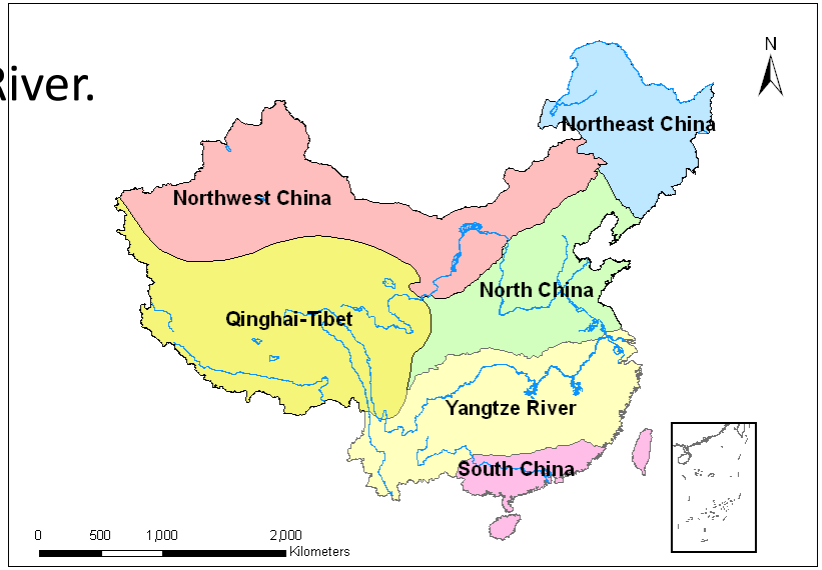
- **One scenario** or several scenarios ?
  - e.g. The Netherlands gw: one, single 90th-ile leaching concentration, if compounds fails: no admission on the Dutch market
  - e.g. Ethiopia: if 2,4-D on teff fails in the single national scenario, e.g. scenario in SNNPS (soil, meteo, T), then it will not obtain registration, so use of 2,4-D in Tigray is not possible



Definition of protection goals: steps in detail

2. Identification of scenario zones

- One scenario or **several scenarios** ?
  - EU: FOCUS Steering Committee fully aware of rigidity of one scenario, so deliberate choice for 10 scenarios (gw as well as sw).
  - e.g. compound fails 8 scenarios, but passes 2 scenarios: a.i. still listed on Annex 1 (and MS have to decide on registration of formulated product)
  - China: political choice for 6 scenarios in 3 zones north of Yangtze River, and 2 scenarios in 2 zones south of Yangtze River. Qinghai-Tibet: no scenarios needed, because little agriculture and political sensitive



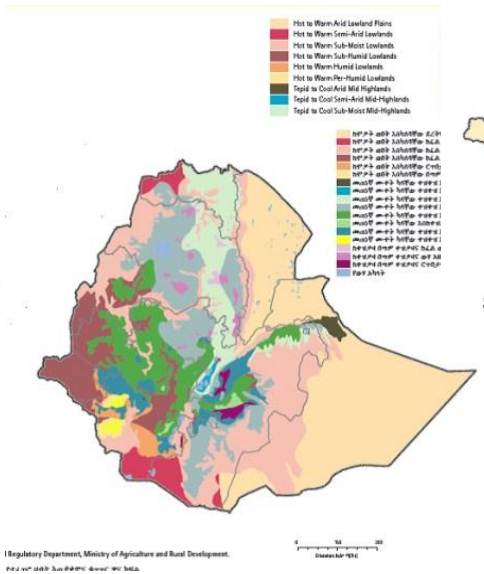
Definition of protection goals: steps in detail

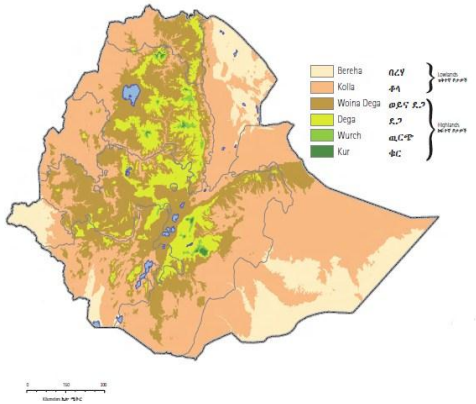
2. Identification of scenario zones

- Decision of political level for Ethiopia: discussion today

  One scenario or split the country in several scenario zones ?

  - One scenario: compound fails: NO registration
  - More scenarios: more flexibility in registration, but difficult to uphold





Definition of protection goals: steps in detail

2. Identification of scenario zones

- Decision of political level for Ethiopia:
  One scenario or split the country in several scenario zones ?

- Why decision NOW needed:
  -> decides on procedure for scenario development:

  – One scenario: define single 90th%-ile situation for the <u>whole country</u>
  – Several scenarios: define for <u>each scenario zone</u> a 90th-%ile situation

Definition of protection goals: steps in detail

2. Identification of scenario zones

- If Ethiopia is split up in several scenario zones, how will these zones be defined ? Which criteria to define them ?

- E.g.
  # federal states ?
  # traditional agro-ecological zones ?
  # refined agro-ecological zones (but 18 scenario zones is too many...., so merge them)
  # other division ?

Definition of protection goals: steps in detail

3. Options for protection goals

- Definitions of options for protection goals, e.g. drinking water from groundwater, drinking water from surface water, aquatic ecosystem, birds, bees, .. (role for scientists)

- What should be protected, where and how strict ?
  Emphasis now on **what** and **where**, so the spatial component

- Make sure to include a description of protection goal in areas with (future) intensive agriculture or horticulture

Definition of protection goals: steps in detail

3. Options for protection goals

- Protection goals in EU:
  - Groundwater (everywhere, to be used as drinking water)
  - Surface water (for drinking water, at intake points for production)
  - Soil
  - Aquatic ecosystem
  - Birds and mammals
  - Bees
  - Non-target arthropods
  - Non-target terrestrial plants
- Specific goals for Ethiopia ?
  - Crocodiles, hippos ;-) ??
  - Surface water for drenching the cattle ?
  - ???

Definition of protection goals: steps in detail

3. Options for protection goals

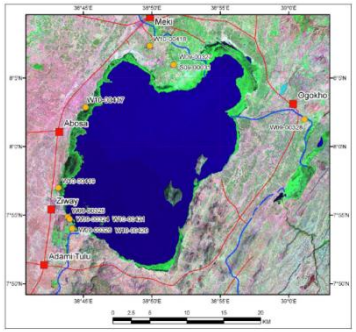
- For each protection goal: specify **what** and **where**
- E.g. groundwater for drinking water:
  - In each village, at shallow depth, location wells, across the entire country ? (so protection needed for few 100 m^2 around well)
  - In villages in Afar and Somali regional states: deep water wells, so protection needed for areas of several km^2
  - In horticultural areas deep water wells of 50-100 m deep

Definition of protection goals: steps in detail

3. Options for protection goals

- For each protection goal: **what** and **where**

- E.g. surface water for drinking water
  - Rivers: size, depth, discharge and its variation, number and location of abstraction points along river, location abstraction point with respect to fields
  - Lakes: size, depth, how is water entrance and drainage, land use along upstream waters, location abstraction point with respect to land use around lake
  - Etc, others ?



Definition of protection goals: steps in detail

3. Options for protection goals

- For each protection goal: **what** and **where**

- E.g. aquatic ecosystem
  - China: Natural ponds, where fish is caught for private consumption
  - EU: all small ditches and streams (1 m wide, 30 cm deep) adjacent to agricultural field, and ponds of 30 m * 30 m * 1 m
  - NL: all ditches adjacent to agricultural or horticultural crops receiving spray drift as well as drainage
  - N.B. aquatic ecosystems in small surface water bodies may result in stricter scenarios than aquatic ecosystems in e.g. lakes where dilution occurs, so, at this stage mention both protection goals (and we'll see later whether the risk assessment can be combined or simplified)

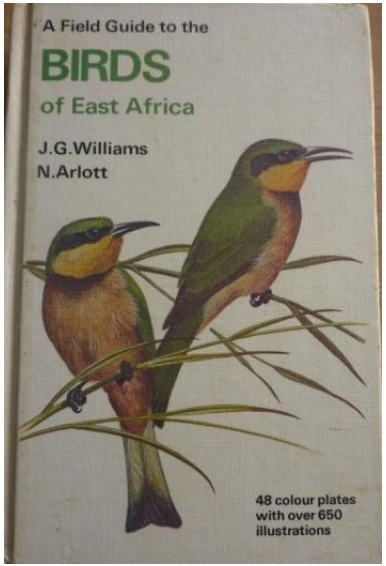
Definition of protection goals: steps in detail

3. Options for protection goals

- For each protection goal: **what** and **where**

- E.g. birds
  - 21 endemic for Ethiopia, (plus 13 semi-endemic, shared only with Eritrea), such as larks, swallows and seedeaters
  - describe agro-environmental conditions, e.g. water birds

Speckled mousebird,
unique variety of birds
in Ethiopia (862 species !)



Definition of protection goals: steps in detail

3. Options for protection goals

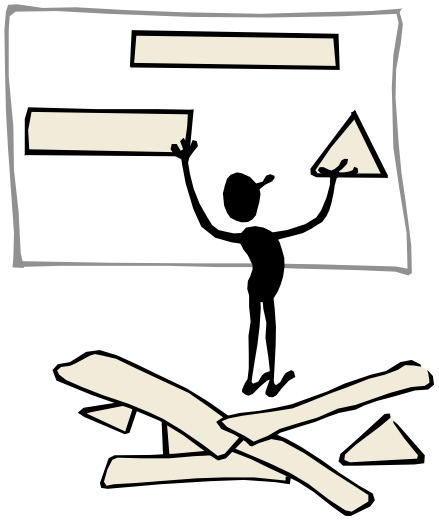
- Now: split up in break-out groups and define the possible protection goals into detail as shown above

- (Form with instructions, scheme to fill in and map with zones will be distributed to groups;
  form also includes question on one scenario or split the country into scenario zones to discuss in groups
  as well as question on procedure for political support)

Break-out groups at work – session 1

- Information available:
  # this presentation (look up to here only)
  # colour prints of traditional and more refined agro-ecological zones and States

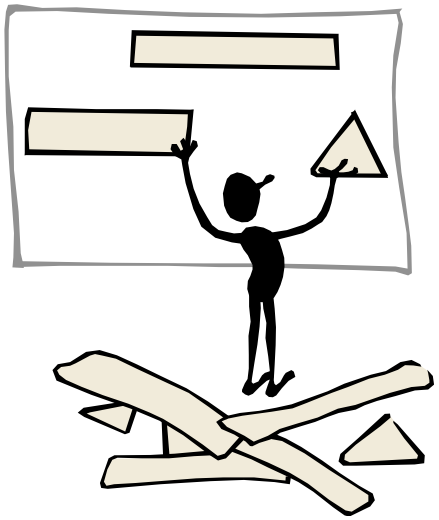
- 3 questions, 1st on procedure political support,
- Other 2 brainstorm by all, but decision later on by political level



Break-out groups at work – session 1

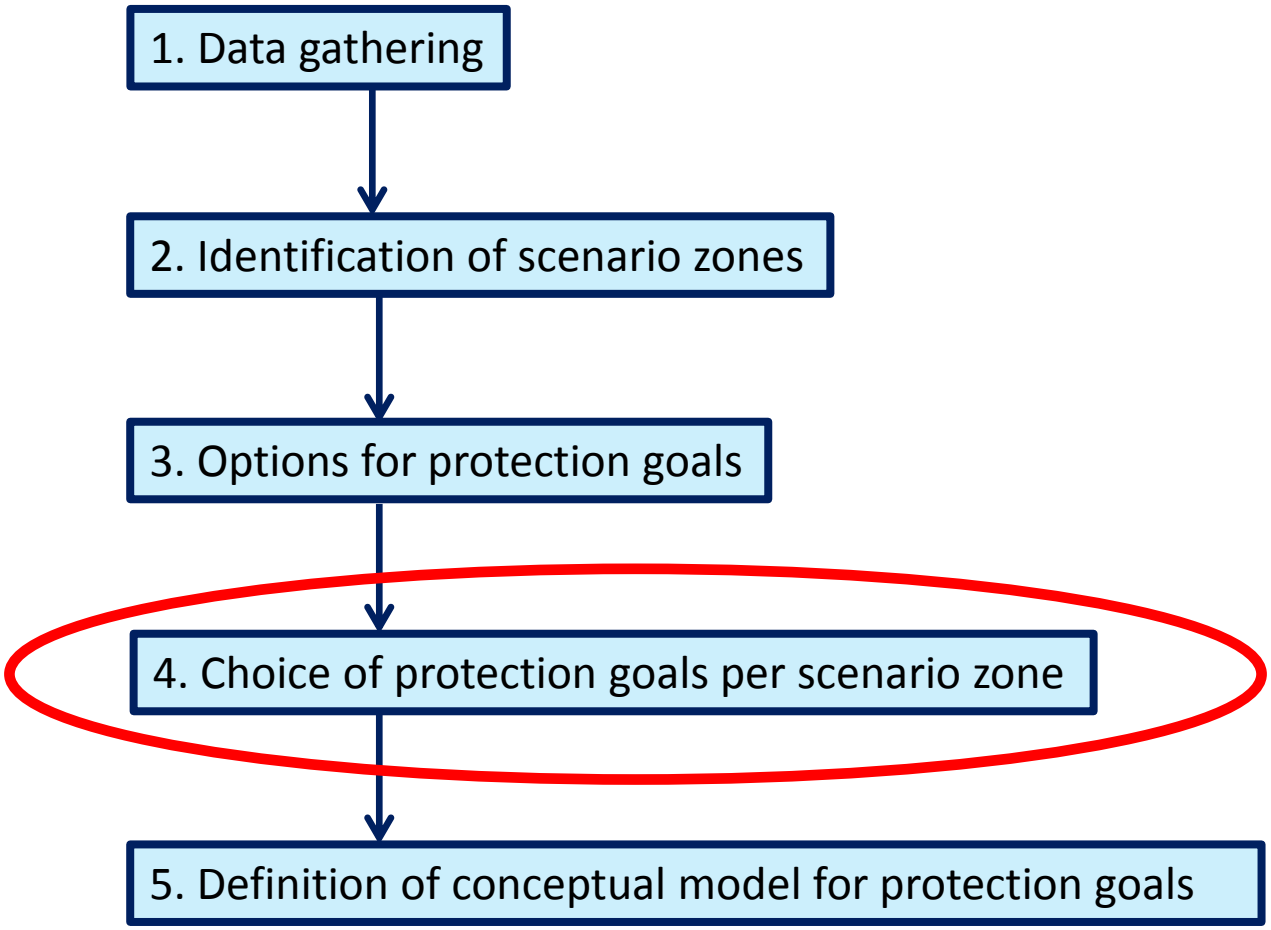
- Question 1: design procedure to obtain political support for decisions made at workshop

- Question 2: registration to be based upon 1 scenario zone or split Ethiopia in more zones ? If split, how ?



- Question 3: make list of potential protection goals, consider environmental compartments as well as organisms

Definition of protection goals



Definition of protection goals: steps in detail

4. Choice of protection goals per scenario zone

- Policy makers select protection goals
- Determine which protection goals valid for which scenario zones
- If necessary: policy makers set priorities in operationalizing the protection goals

Definition of protection goals: steps in detail

4. Choice of protection goals per scenario zone

- First: policy makers select protection goals, based upon the list of goals we prepared today

- Next: determine which protection goals valid for which scenario zones (all groups)
  - e.g. if sw in scenario zone is not used for drinking water, do not consider this zone in your scenario selection procedure for the sw protection goal
  - Definition of scenario zones should focus on the overlap of areas where protection goal is relevant and where agriculture uses pesticides
  - If protection goal focuses on human health (indirectly), then focus on areas with use of most toxic compounds (i.e. insecticides instead of herbicides/fungicides) may be intelligent, pragmatic choice
  - So, step 2 identification of scenario zones is further detailed in this step 4

Definition of protection goals: steps in detail

4. Choice of protection goals per scenario zone

- This results in an overview of protection goals, coupled to scenario zone(s)

- If necessary: policy makers set priorities in operationalizing the protection goals
  - Weighting e.g. economy vs environment is national policy
  - Each protection goal needs it own assessment method
  - E.g. pragmatic choice for considering only areas with current pesticide use, not future areas

Definition of protection goals: steps in detail

4. Choice of protection goals per scenario zone

- Now: split up in break-out groups and

- All groups:
  # determine which protection goals are valid for which zones
  # which combinations are most important and why ?

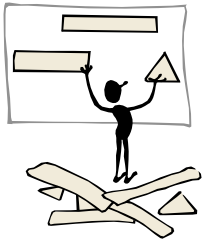
- Group of policy makers: select protection goals and set priorities

- (Form with instructions, list of potential protection goals, map with scenario zones will be distributed to groups)

Break-out groups at work – session 2

- Information available:
  # this presentation (look up to here only)
  # list with potential protection goals
  # colour prints of traditional and more refined agro-ecological zones → indicate scenario zones defined

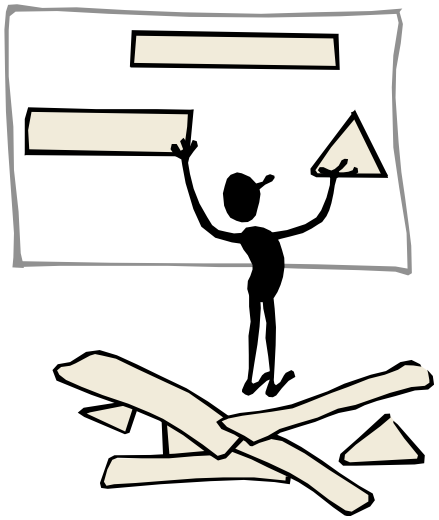
- Update 17 Nov:
- *Assume 6 traditional agro-ecological zones (where pesticides are used on crops) to be the scenario zones*
- 4 questions, all 4 to discuss, last 2 to decide upon later in central discussion by political level



Break-out groups at work – session 2

- Question 1: which zone is relevant for each protection goal ?

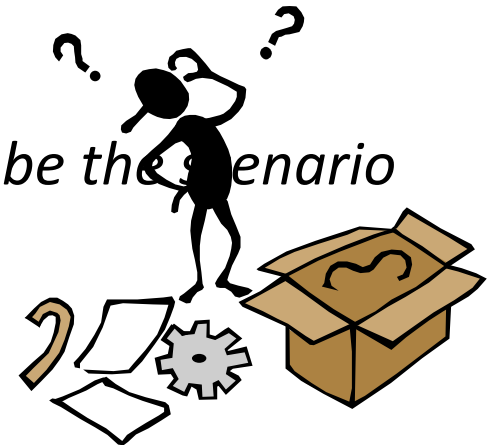
- Question 2: which combination of potential protection goals and zone(s) are most important ? Reasons ?



- Question 3: select protection goals for Ethiopia

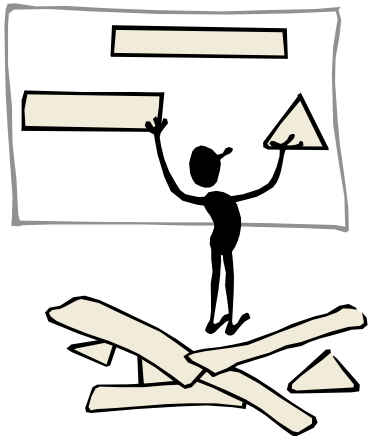
- Question 4: prioritise selected protection goals and explain

Break-out groups at work – session 2



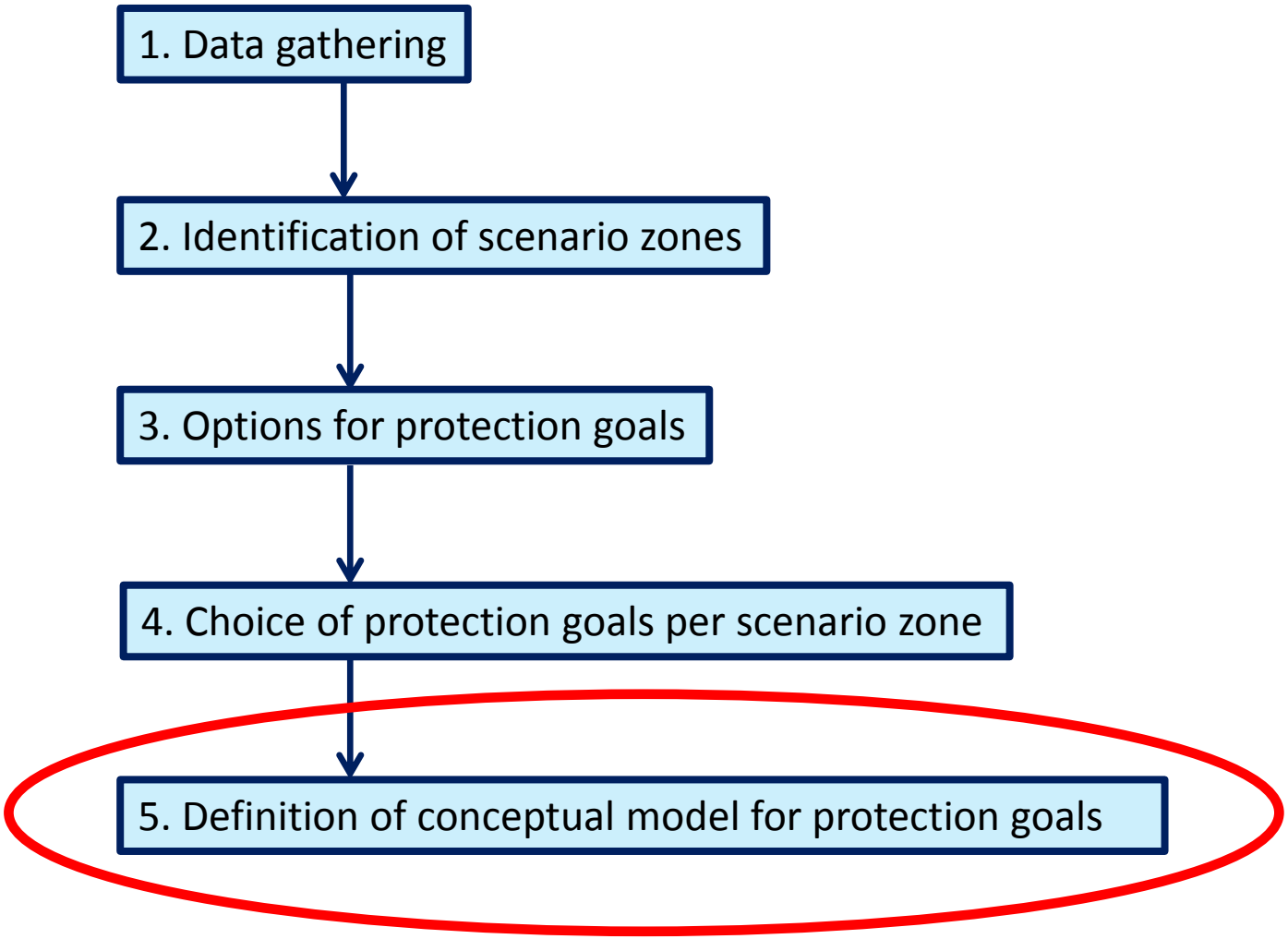
- Update 17 Nov:
- *Assume 6 traditional agro-ecological zones to be the scenario zones*

- Answer then questions 1+2 and ***describe protection goal into more detail for each goal in each zone*** e.g. gw at >20 m deep for towns, or 2-4 m deep for villages. Same for sw, e.g. which sw to protect in Bereha ?



- Question 3: select protection goals for Ethiopia: *already done 16 Nov*
- Question 4: prioritise selected protection goals and explain. *Now for detailed protection goals*

Definition of protection goals



Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Define conceptual model for each protection goal:
  - Lay out scenario: e.g. catchment size, size adjacent field to surface water, surrounding fields, size sw body, which fields treated ?
  - Entry routes of pesticides
  - Farm types (smallholders, or large-scale investment farming: flowers or other commercial farms? Latter use 10 more pesticides than flower farms, so also important !) What characterises the farm types ?
  - Application techniques used
  - Relevant crops
  - Relevant pesticide processes

- N.B. Good Agricultural Practice (GAP) is the basis for the risk assessment method, so also for the conceptual model

Entry route runoff

Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Define conceptual model for each protection goal
- Start with conceptual models for 2-4 highest priority goals

- Conceptual model should contain all information relevant for determining the exposure
- Consists of a picture/drawing plus description

Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

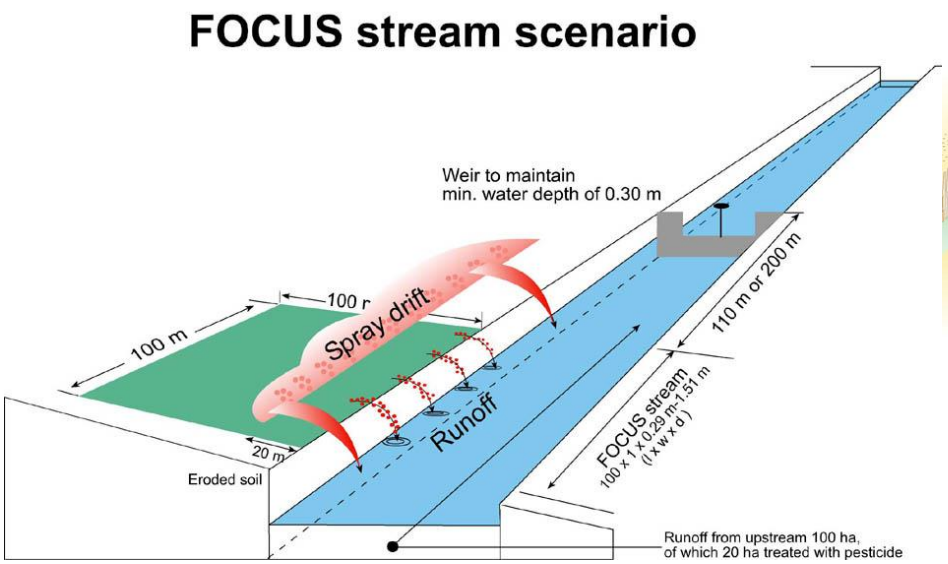
- If two fundamentally different situations exist for one protection goal, and it is a priori not evident which situation is the ‘realistic worst case’, then it may be necessary to design two conceptual models
  - e.g. surface water for drinking water from river, but also from lake with nearby intensive horticulture -> two lay outs needed

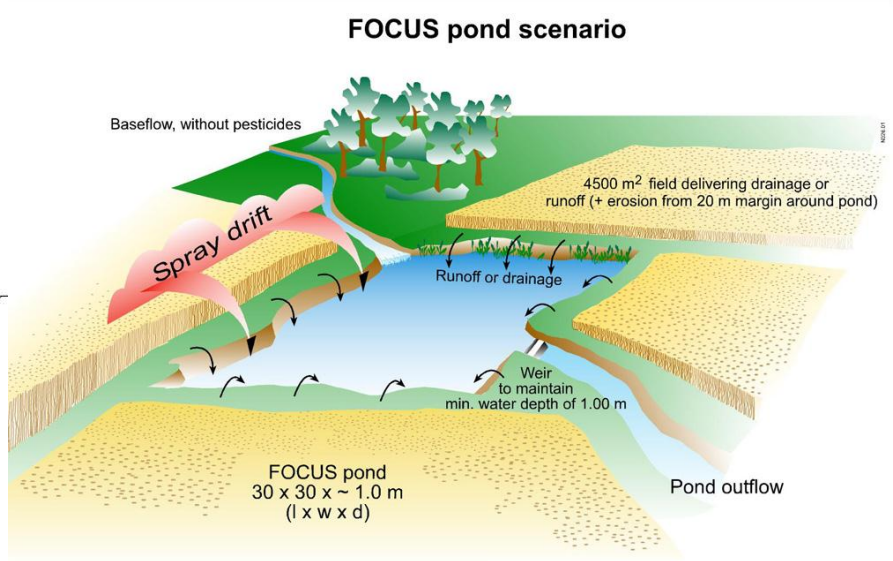
- Possible elements for some protection goals explained in next slides

Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Protection goal: aquatic ecosystem in small surface waters EU
  - Lay out + entry routes

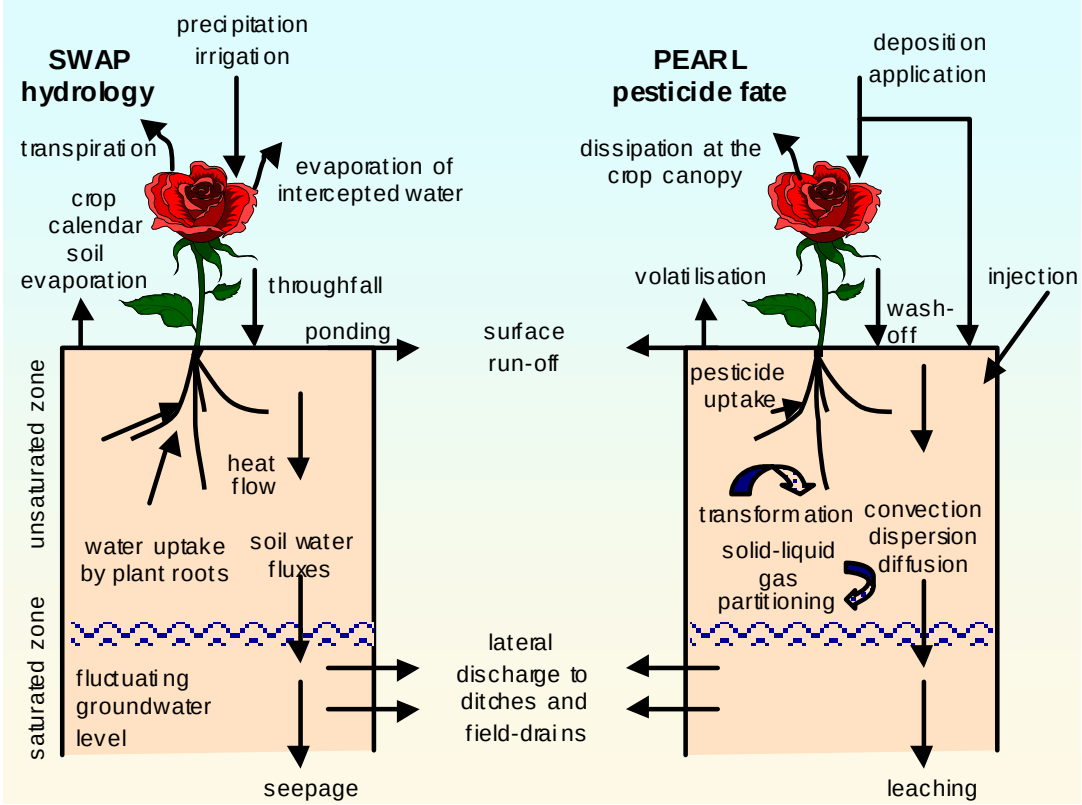




Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

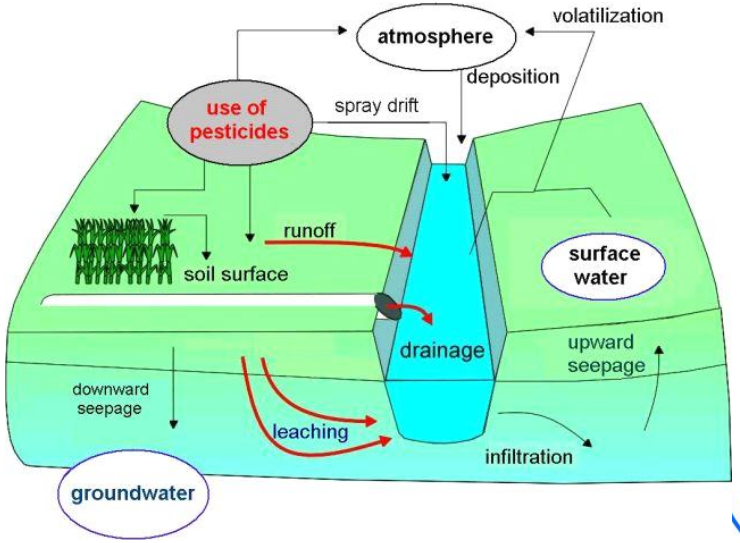
- Protection goal: groundwater NL
  - Lay out and relevant water and pesticide processes



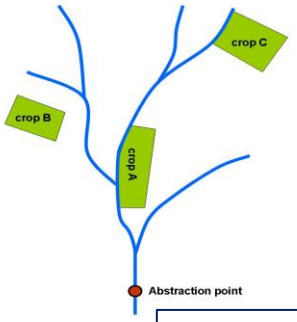
Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

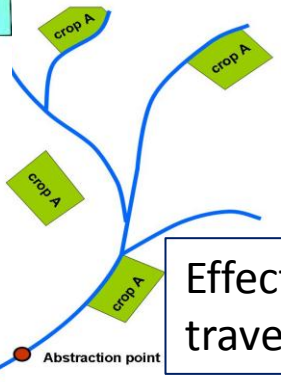
- Protection goal: drinking water from surface water, NL



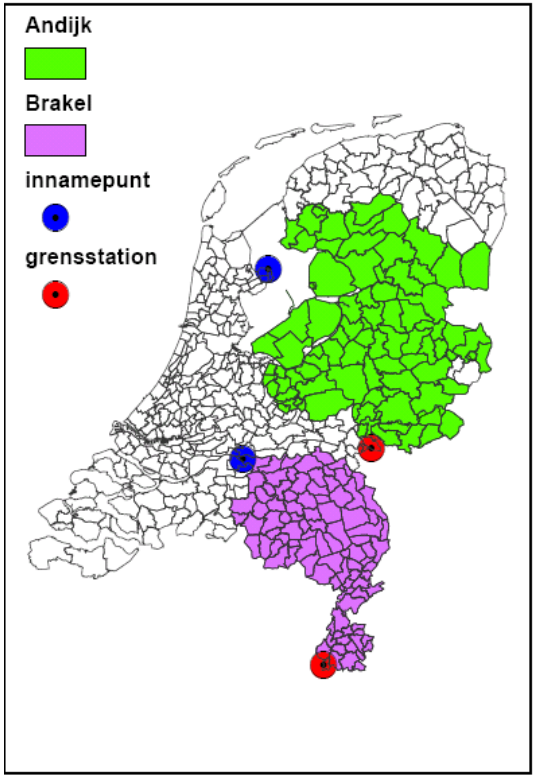
Relevant entry routes:
spray drift deposition
drainage



Effect of crops



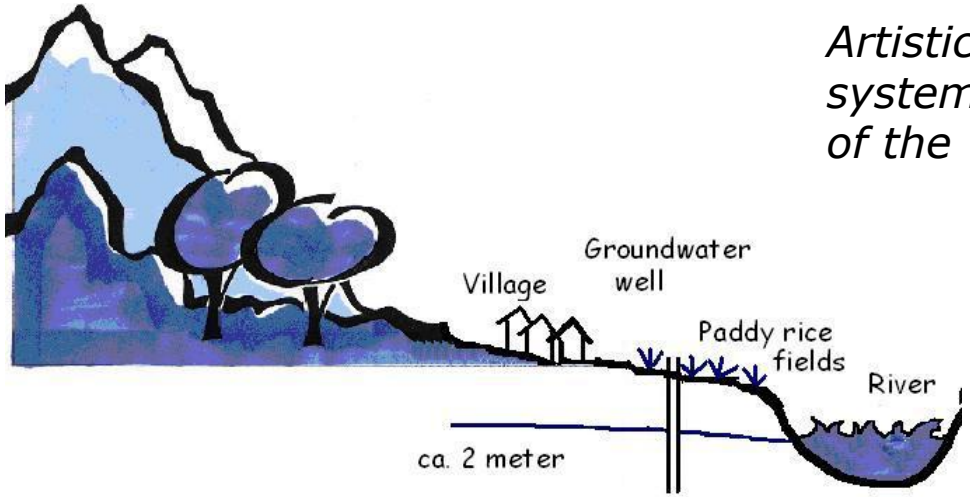
Effect of travel time



Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Protection goal: groundwater for drinking water, China
  - Lay out + entry route+ location treated crops



Artistic impression of the groundwater system used as drinking water south of the Yangtze River in China

Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

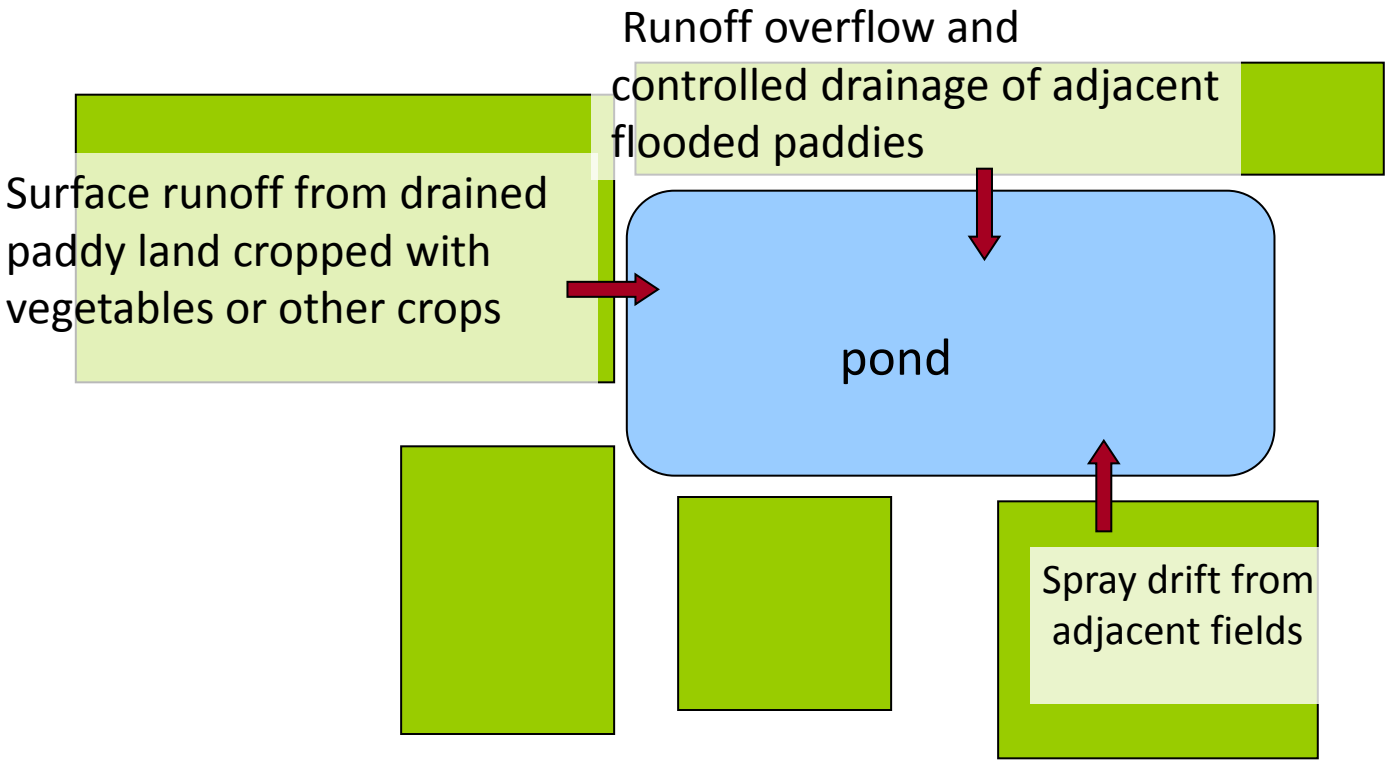
- Protection goal: aquatic ecosystem in natural ponds, China
  - Pictures

Commercial fish pond (A) and natural pond (B) in China; B is protection goal, A is not!

Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Protection goal: aquatic ecosystem in natural ponds, China
  - Lay out + entry route+ location treated crops



Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Possible elements for description
  (plus additional explanatory drawing, if handy)

  - Farm types (smallholders or large-scale investment farming)
    e.g. size farm and fields, type of land preparation
  - Application techniques used
    e.g. knapsack sprayer (types ?), tractor with spray boom, airplane, link to crop management
  - Relevant crops (on which pesticides are used)
    e.g. crop calendar with main crop management activities
  - Relevant pesticide processes:
    focus on exceptional/ country specific aspects

Definition of protection goals: steps in detail

5. Definition of conceptual model for protection goals

- Conceptual model of the protection goal is basis for further scenario selection and parameterization (steps 6-10)

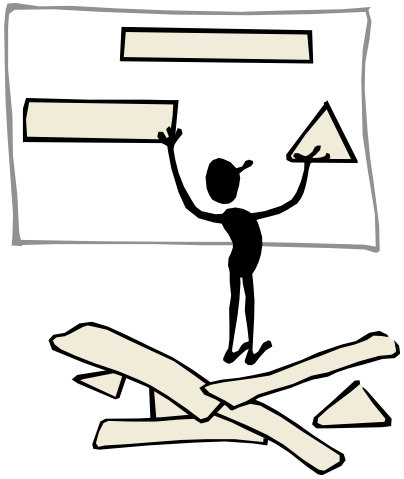
- Another session in break-out groups needed to define the conceptual model for 2-4 priority goals. Two groups for same protection goal, finalise conceptual model in central discussion session.

- (Form with instructions for the assigned protection goal will be distributed to groups)

Break-out groups at work – session 3

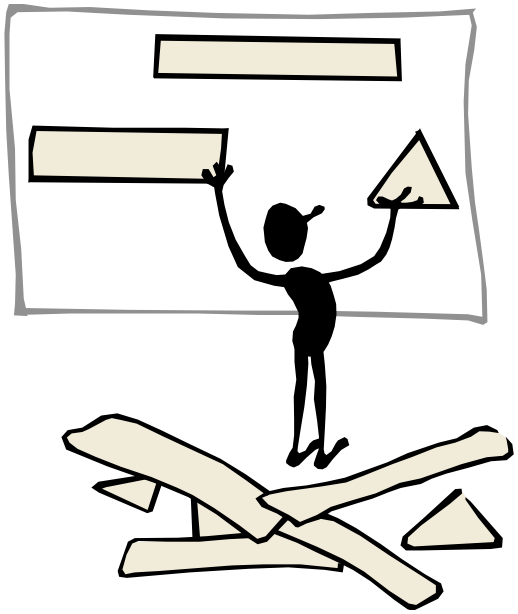
- Information available:
  # this presentation (look up to here only)
  # list with selected protection goals
  and zones where they are relevant
  (on map)

- 1 question, each group has another protection goal, for which they design the conceptual model



Break-out groups at work – session 3

- Question 1: design conceptual model for assigned protection goal;
  # use drawings plus description
  # based upon Good Agricultural Practice



Definition of protection goals