Challenges in developing pesticide indicators and setting targets

Lise Samsøe-Petersen

Danish Environmental Protection Agency

The need for an indicator

- For telling us whether we achieve our objectives

- The present (till yesterday) Danish objective is
    - "A pronounced reduction of the harmful effects of pesticides on animals, nature and human beings"

- Treatment Frequency Index insufficient for measuring environmental impact

What we need

- Preferably, one indicator on EFFECTS in nature
  - Definition of **target** should be based on natural conditions, we want
  - Therefore, we should define, what we want

- Failing that, one or more indicators on the environmental LOAD
  - Definition of **target** arbitrary (read "political")

Indicator of impact or load?

• No indicators of **effects** in nature available

• Available indicators are based on

  - results of laboratory toxicity tests

  - measure of amounts of pesticides

  - ± environmental exposure

• I.e. only indicators of **load** available

Indicators considered

- Treatment Frequency Index

- Load indices

- "Risk indicators" including measures of environmental exposure

  - SYNOPS (German)

  - NMI (Dutch)

  - PestNab (proposal for a new Danish)

  - NERI (Norwegian)

Treatment Frequency Index (TFI)

•The number of times the agricultural area can be treated with the amount of pesticide sold per year (Number of "toxicity doses"/ha/year)

  - Measures the "amount of poison applied" – based on toxicity to target organisms

•Can be aggregated into one value

•No information regarding exposure of nature
  - "the more pesticide – the higher the exposure of nature"

•Uses:
  - monitoring of TFI
  - comparison with target figure

•Target:
  - Existing target value based on economic calculations – "as little as possible, as much as needed"

Treatment Frequency Index

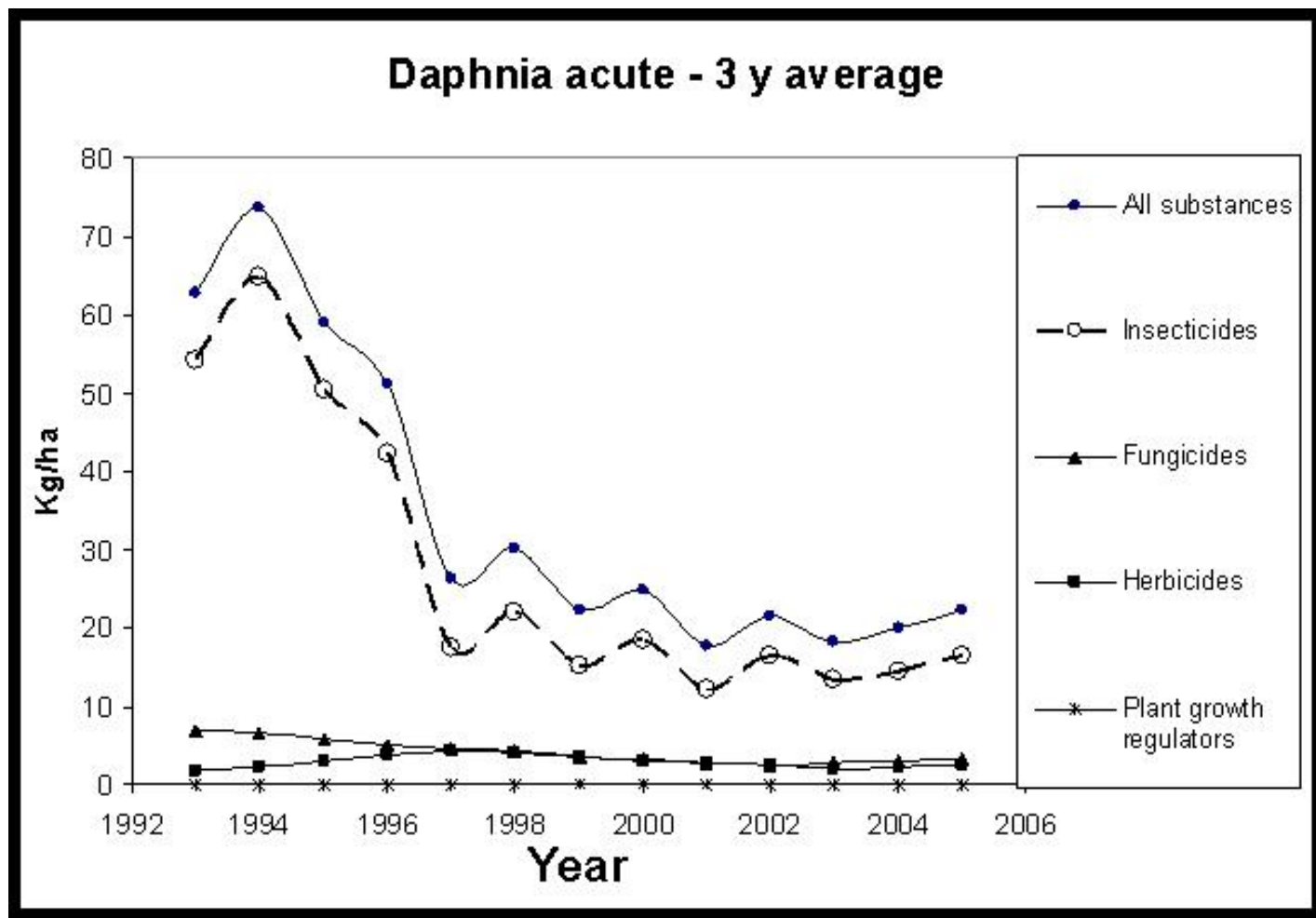**Treatment Frequency Index - 3 year averages; 1986-2006**
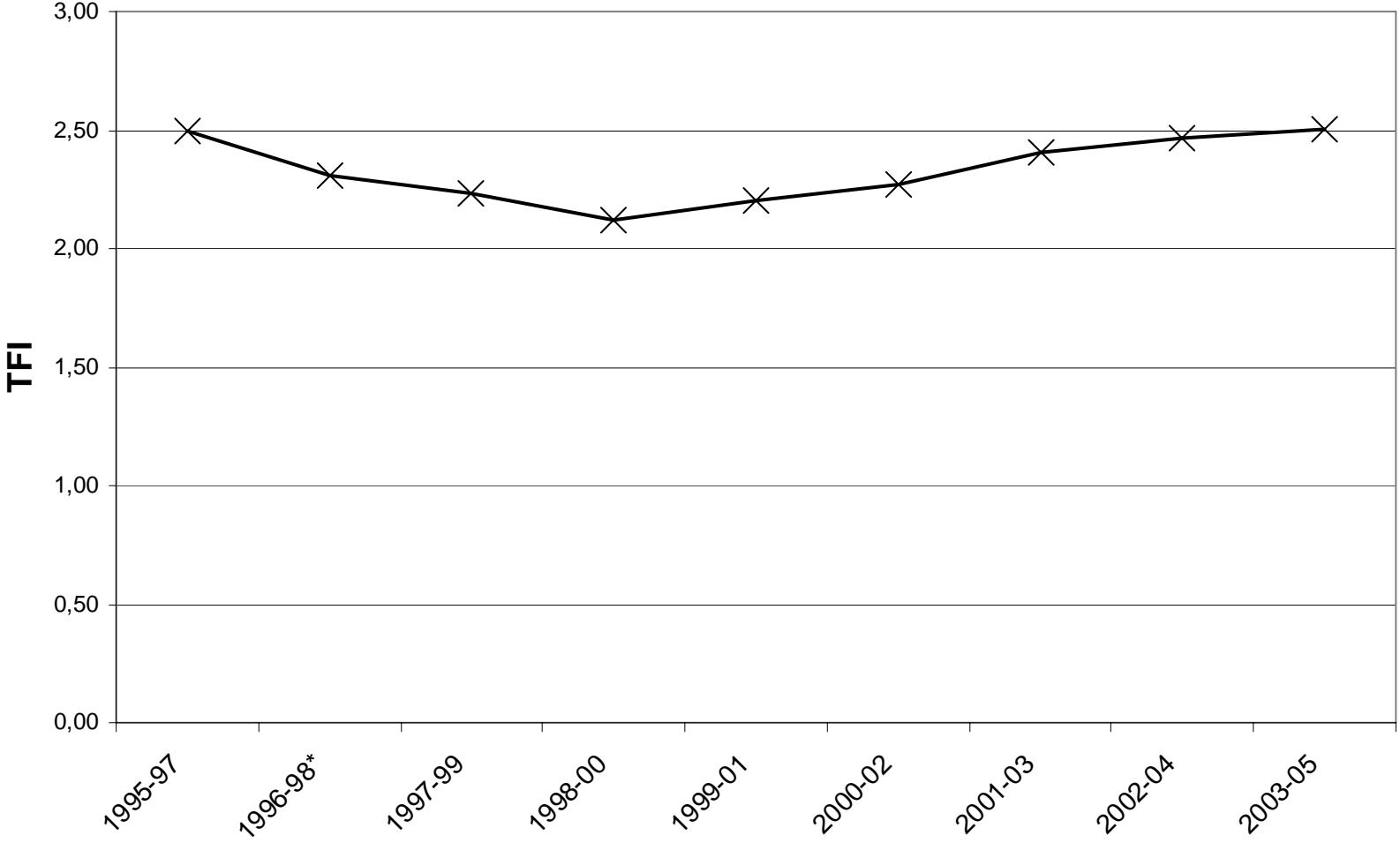
Load indices

- Amount of substance per year * toxicty to non-target organisms (Number of "toxicity doses"/ha/year)
    - Measures the "amount of poison applied" – based on toxicity to non-target organisms (algae, crustaceans, fish, earthworms, bees, birds and mammals)

•Also for ED, Carc3 and GUS

•Cannot be aggregated into one value

•No information regarding exposure of nature
    - "the more pesticide – the higher the exposure of nature"
-Uses:
    - monitoring of load indices
    - identification of pesticides causing highest load
-**Target**:
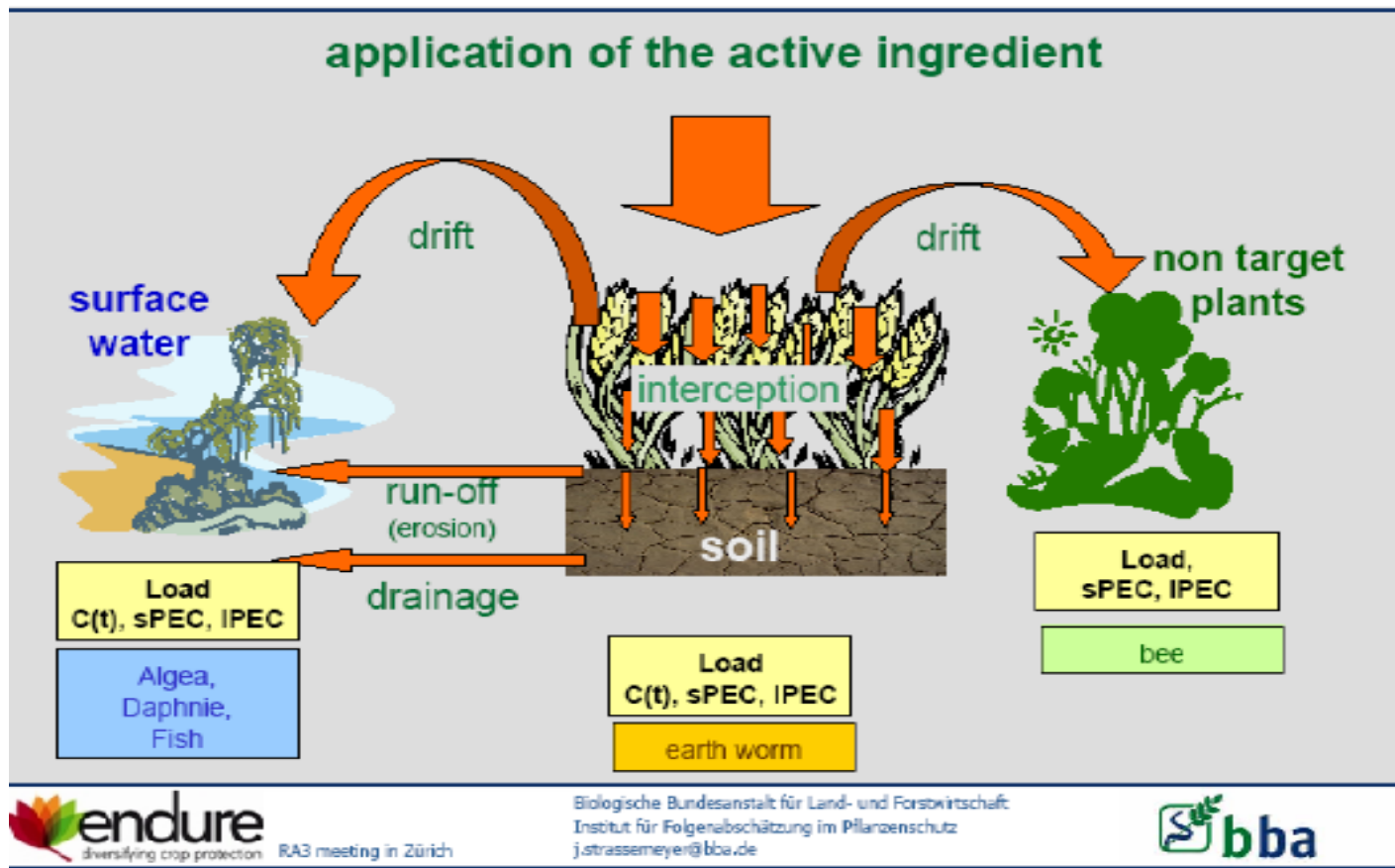   - No target value – could be set for each parameter

Load indices

Indicators including exposure

modeled pathways in SYNOPS

application of the active ingredient

drift — drift

surface water — non target plants

interception

soil

run-off (erosion)

drainage

Load C(t), sPEC, IPEC

Algea, Daphnie, Fish

Load C(t), sPEC, IPEC

earth worm

Load, sPEC, IPEC

bee

endure
diversifying crop protection
RA3 meeting in Zürich

Biologische Bundesanstalt für Land- und Forstwirtschaft
Institut für Folgenabschätzung im Pflanzenschutz
j.strassemeyer@bba.de

bba

SYNOPS (DE) & NMI (NL)

• Based on risk assessment (Exposure–Toxicity–Ratio)

• Exposure: PEC acute og chronic ~ EU-principles

• Exposure parameters: different for national (worst case), regional or local level

• LC50 or NOEC (algae, crustaceans, fish, earthworms, bees)

• Cannot be aggregated into one value

• Uses:

- monitoring of risk index

- comparison with target value

- NMI also for decision support

PestNaB*

•All existing indicators have deficiencies with respect to estimating the load on nature

•The proposal for a new indicator (PestNaB) uses the best from the existing indicators and remedies the problems of the others

•PestNaB was developed to produce a target value that would allow for comparison with the present target value for the TFI.

*Developed by National Environmental Research Institute (DK)

Danish Environmental Protection Agency

The basis of PestNaB

•Includes exposure and toxicity to non-target organisms

- Where is nature?

- Where are the pesticides applied?

- Which pesticides are applied?

- How toxic are the pesticides?

•**Target**: Could be based on reference scenario – possibly related to the target TFI

Danish Environmental Protection Agency

NERI (Norwegian)

- Based on scores **assigned to each product**

- Risk calculated ~ EU-principles (TER) – and transferred into **scores** from 1-4

- Earthworms, bees, other non-target arthropods, birds, aquatic organisms, leaching, persistence, bioaccumulation

- In combination with consumption, an "environmental load score" is achieved

- Uses:
  - monitoring of total score (incl. health)

- **Target**: Arbitrary – e.g. reduction of risk by 25%

What we do in DK at present

- •Short term

  - - TFI   As usual   Target available

  - - Load measures   Under development   Target possible

- •Long term

  - - Develop indicators of effects   Possibilities being investigated