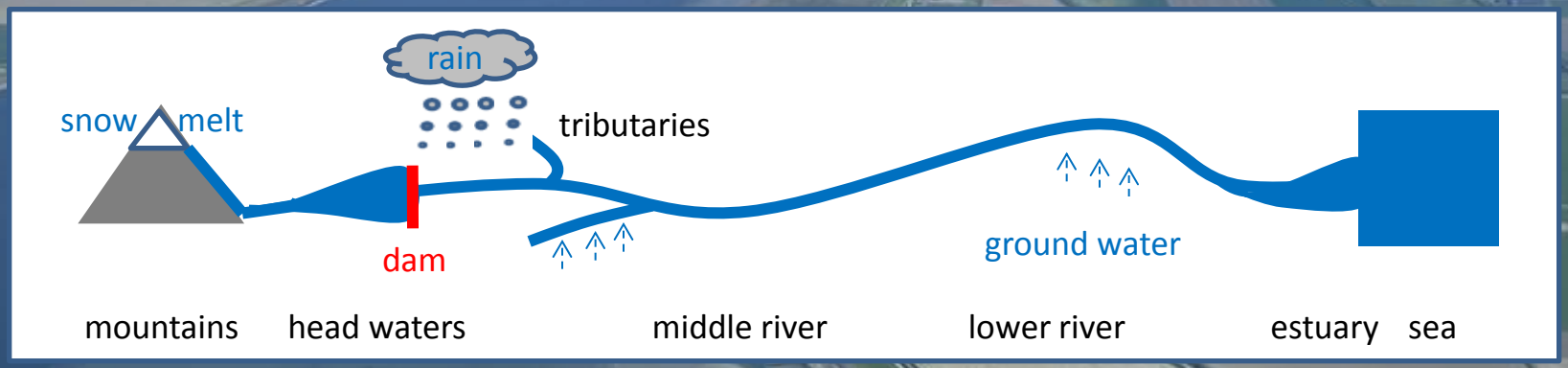
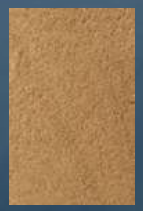
Session “Sediment balance”. Genoa. Italy, 15 June 2017

Chair:
Jos Brils, Deltares
SedNet steering group member
jos.brils@deltares.nl

10th International SedNet conference: Sediments on the move.

Session outline

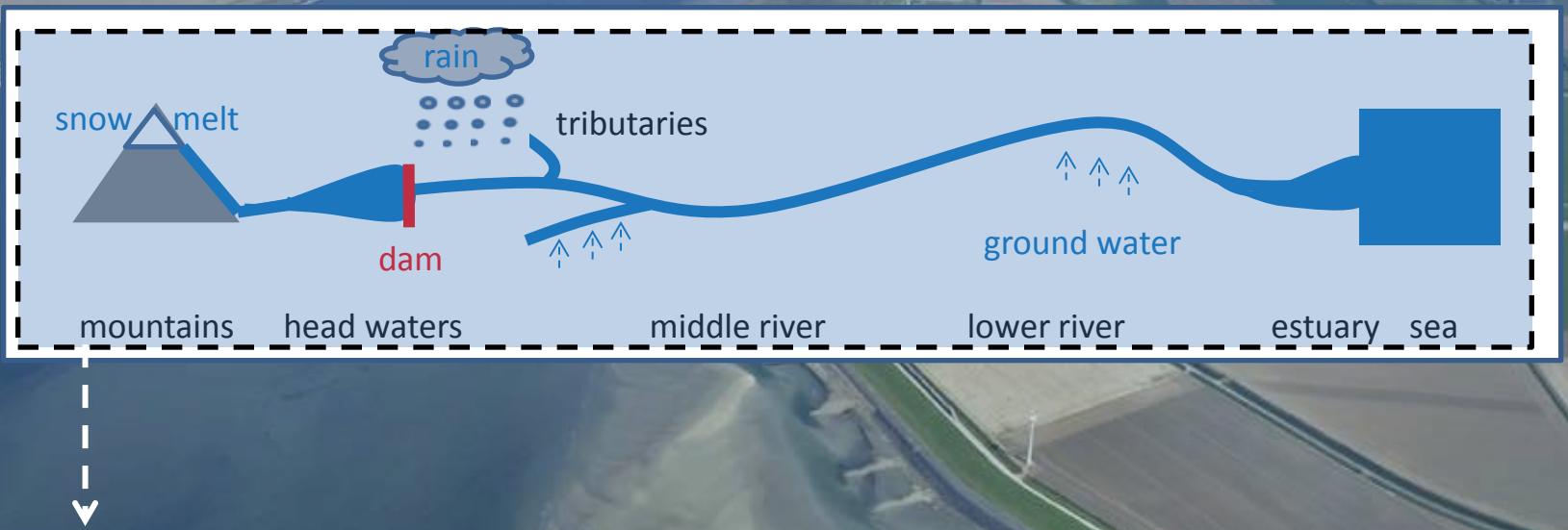



gravel sand silt / mud clay sand

"From the mountains till at sea"

Session outline

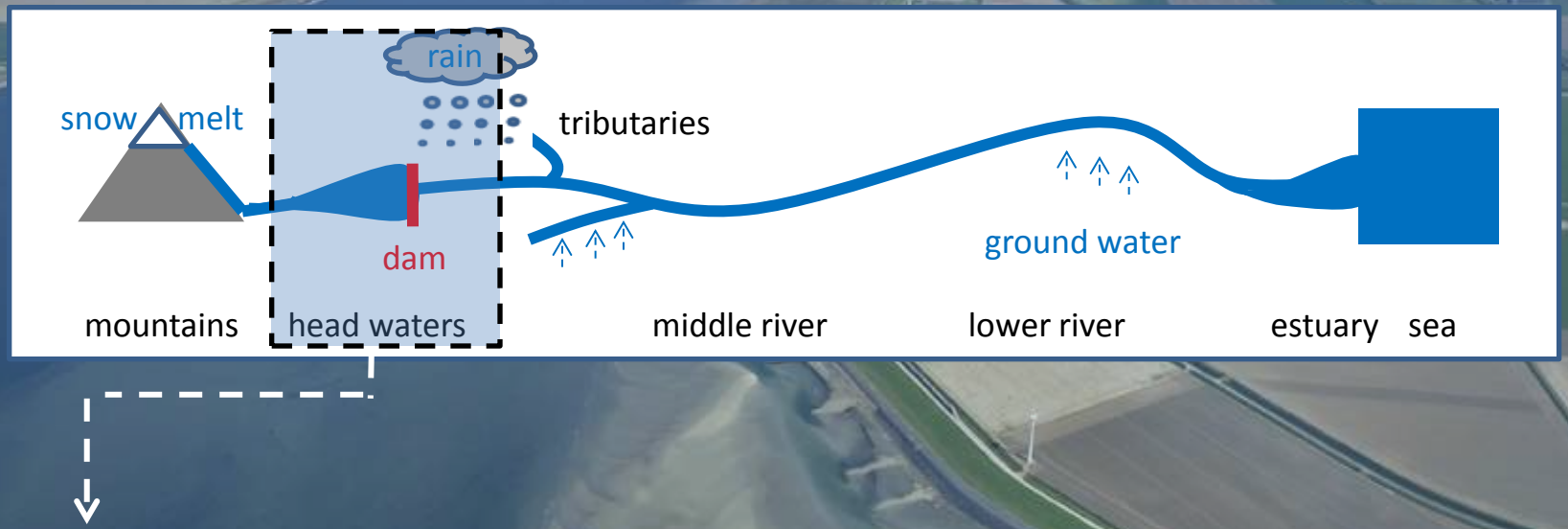


1st talk (invited key-note):

Challenges, impacts, and management opportunities for sediment in large river basins

***Mathias Kondolf**, University of California Berkeley, USA*

Session outline

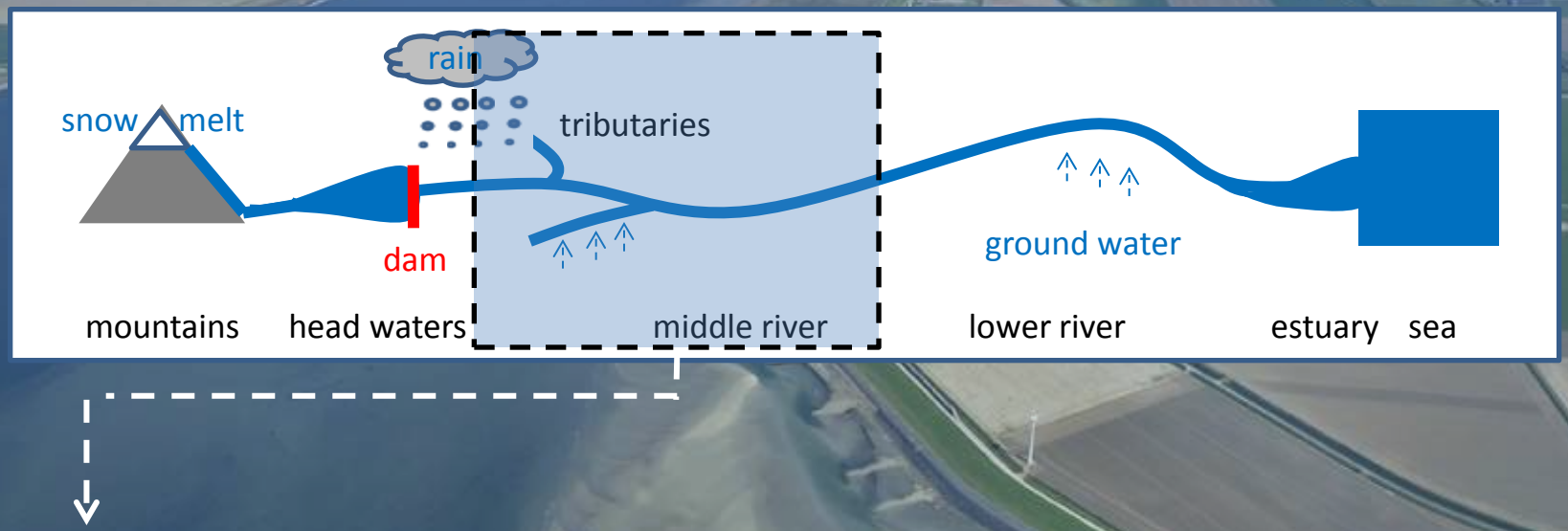


2nd talk:

Biotic impact of different sediment flushing practices in Italian alpine rivers

Daniele Demartini, Riverment, Italy

Session outline

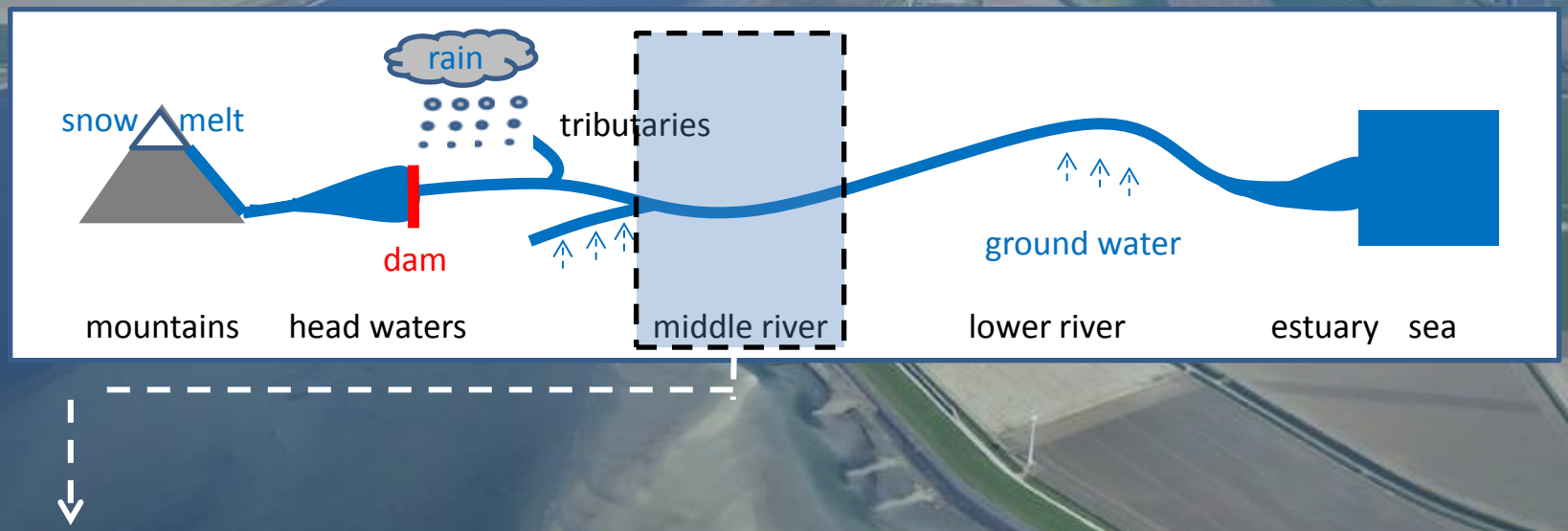


3rd talk:

Uncertainty assessment on erosion of cohesive sediment in the Upper Rhine: Implications for sediment management

Thomas Hoffmann/Gudrun Hillebrand, Federal Institute of Hydrology, Germany

Session outline

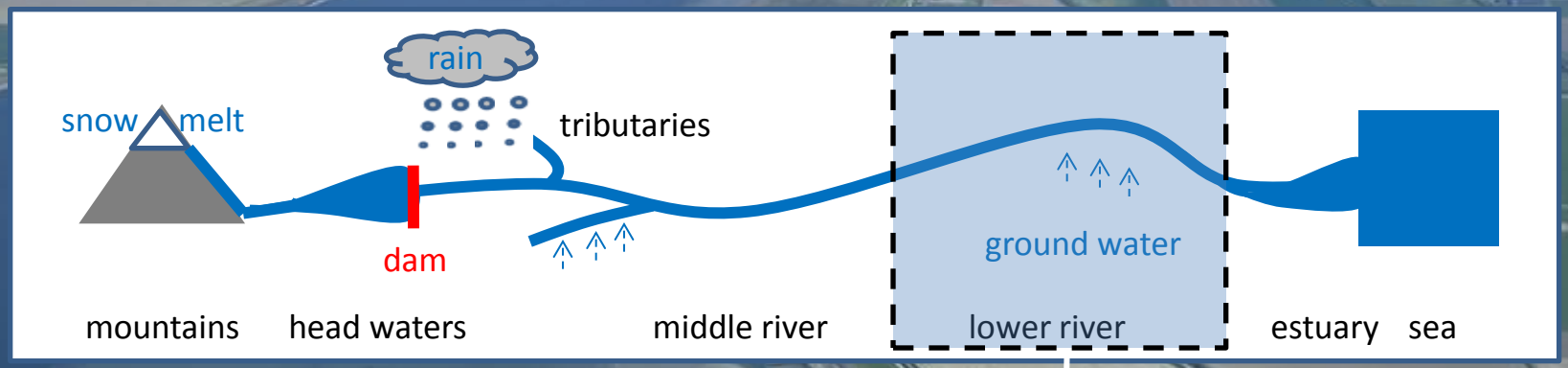


4th talk:

Implications of spatial distribution of suspended sediment concentrations on reservoir management, case study Iffezheim

Gudrun Hillebrand, Federal Institute of Hydrology, Germany

Session outline

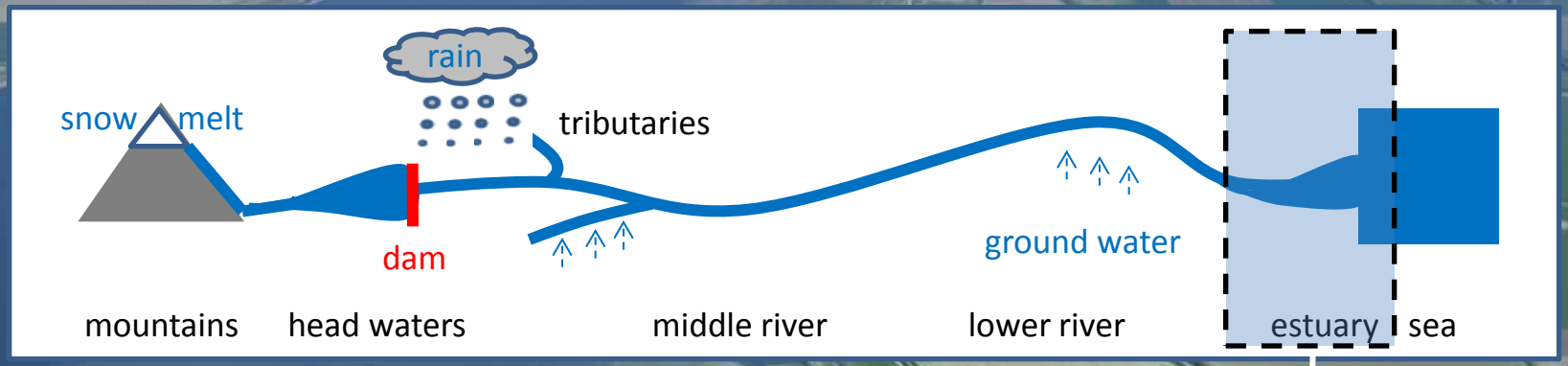


5th talk:

Regaining sediments: the Orba River lower reach bank erosions (NW Italy)

Andrea Mandarino, University of Genova, Italy

Session outline

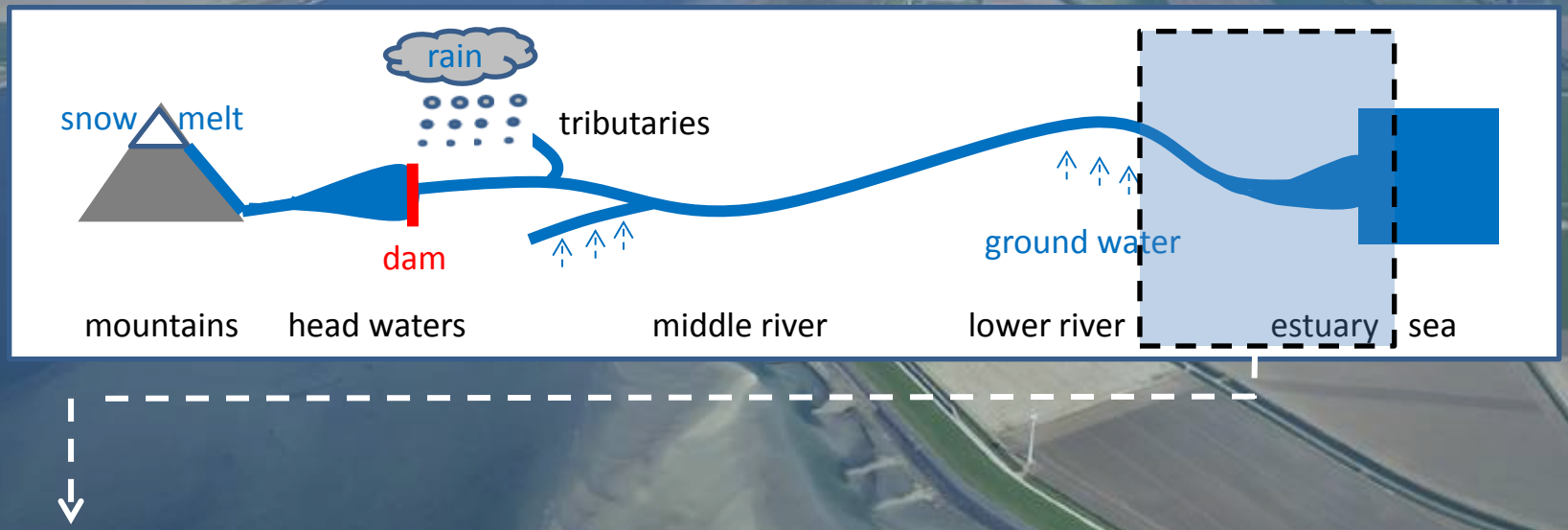


6th talk:

Assessment of Vistula delta cone development under sediment deficit conditions (Poland)

Michal Habel, Kazimierz Wielki University, Poland

Session outline

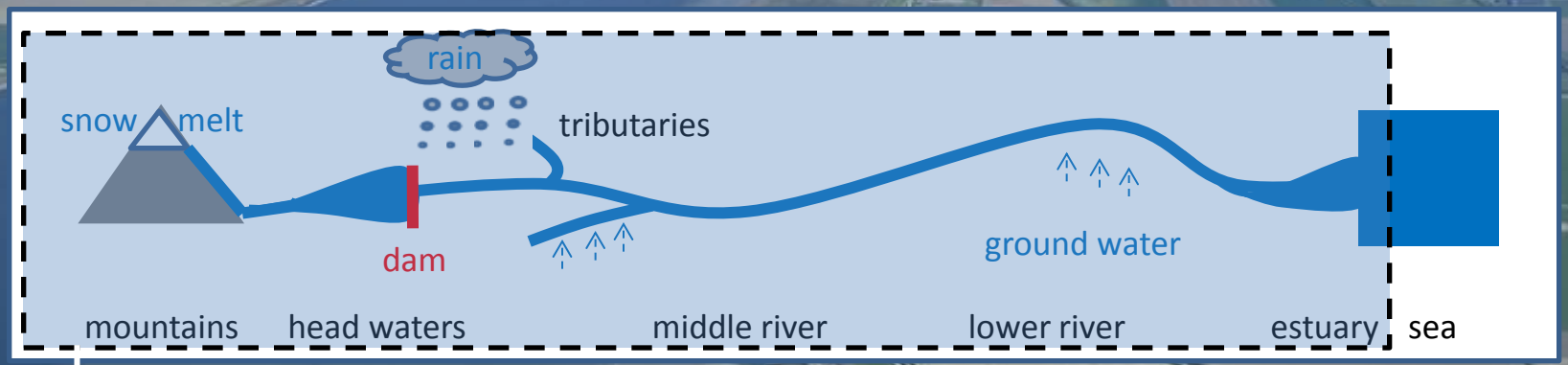


7th talk:

Uncertainty in complex three-dimensional sediment transport models: implications for management

Katherine Cronin, Deltares, NL

Session outline

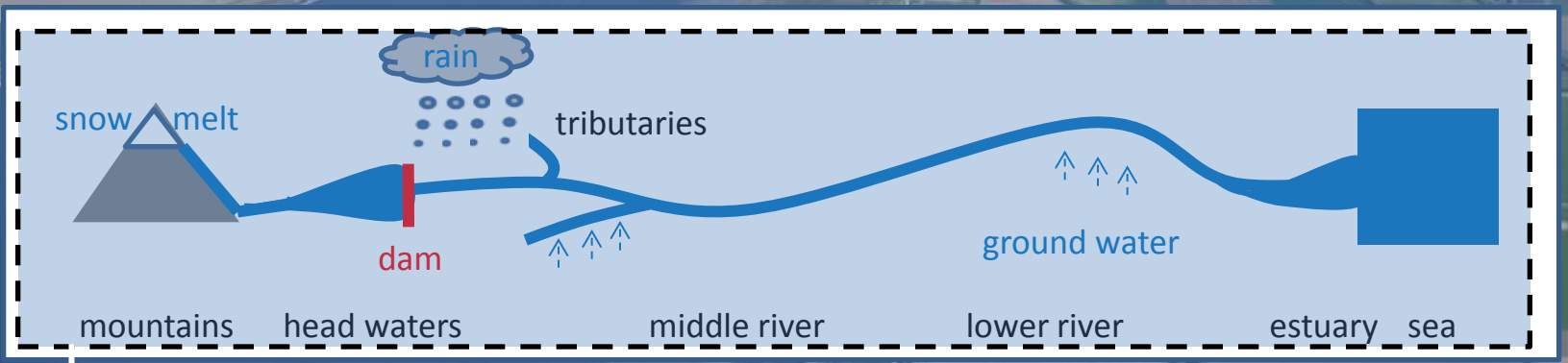


8th talk:

The imperative of sediment management concepts in River Basin Management Plans

Axel Winterscheid/Stefan Vollmer, Federal Institute of Hydrology, Germany

Session outline



9th talk followed by discussion session:

Sediment balance disturbed: so what and what next?

***Jos Brils**, Deltares, The Netherlands &*
***Elmert de Boer**, Rijkswaterstaat, The Netheralnds*

Sediment balance disturbed: so what and what next?

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10th International SedNet conference: Sediments on the move. Session "Sediment balance". Genoa. Italy, 15 June 2017

What is sediment?

Sediment is:

- suspended or deposited solid, of mineral as well as organic nature, acting as a main component of a matrix, which has been, or is susceptible to being transported by water*
- an essential, integral and dynamic part of our river basins**

Some appearances of sediment:

suspended particulate matter (SPM)

silt / mud

clay

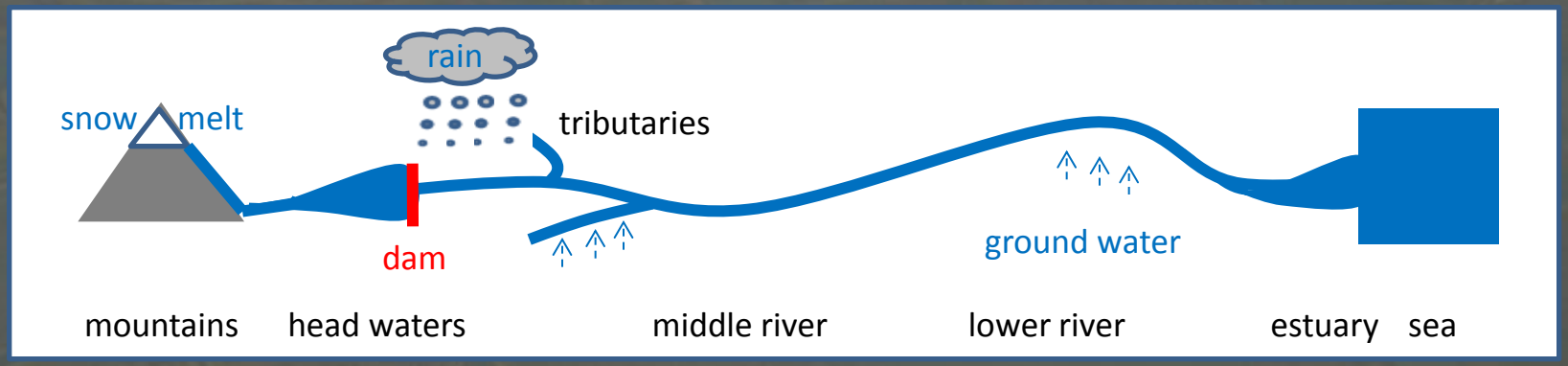
sand

gravel

* *Brils (2004) The SedNet Strategy Paper – The opinion of SedNet on environmentally, socially and economically viable sediment management, SedNet, June 2004*

** *Salomons & Brils (eds) (2004) Contaminated sediments in European River Basins, SedNet publication*

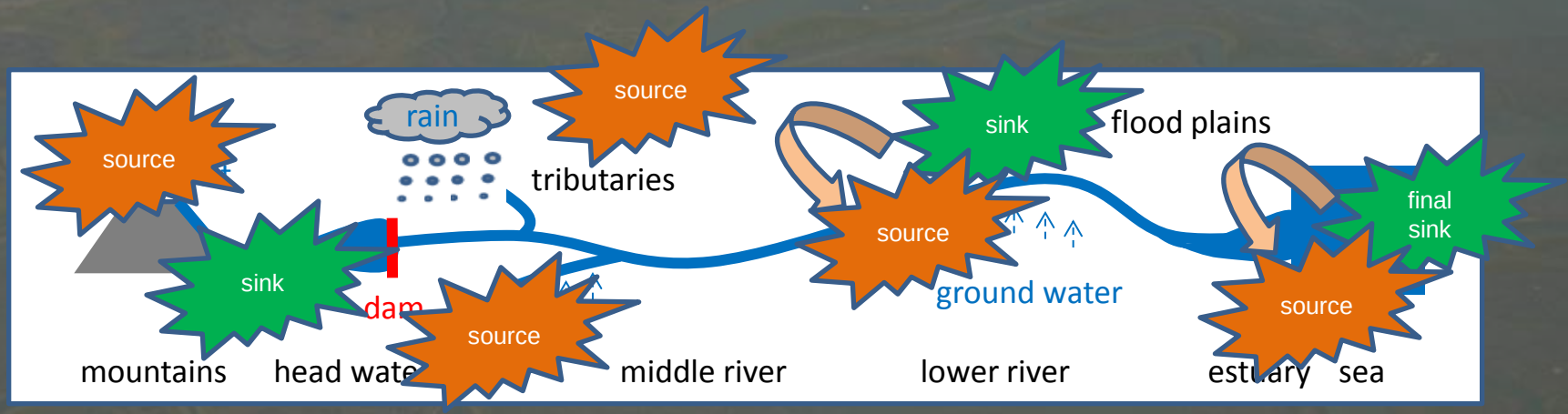
Sediment on the move



gravel sand silt / mud clay sand

"From the mountains till at sea"

Sediment from source to sink



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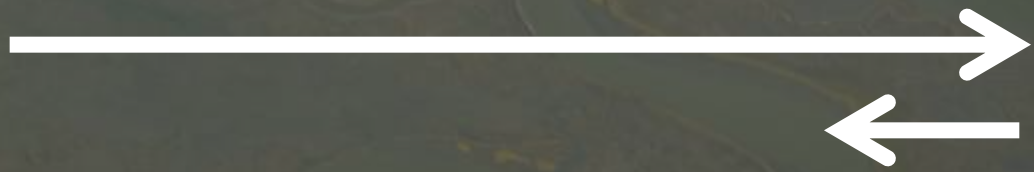
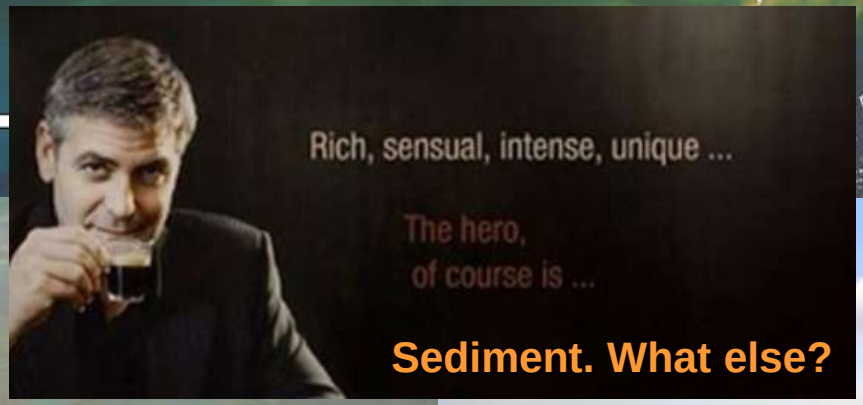


"It's a dynamic balance"

The nexus between land and sea?



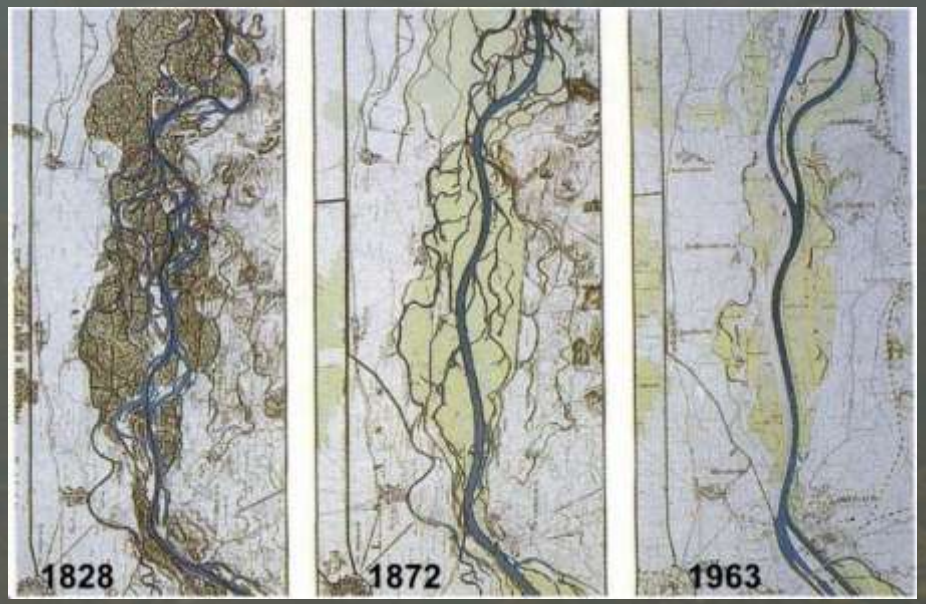
Venice Lagoon, Italy. Picture: J. Brils

Pungue River, Mozambique. Picture: J. Brils

Disturbed sediment balances

Worldwide natural sediment equilibriums are seriously obstructed by human interventions. Examples are:

- Damming for hydro-power production and for flood protection
- River training for improving navigability
- Water diversion for water supply and irrigation



- Dredging for improving navigability, for improving drainage capacity and for mining of building material (sand and gravel extraction)
- Dike construction for flood protection and land reclamation

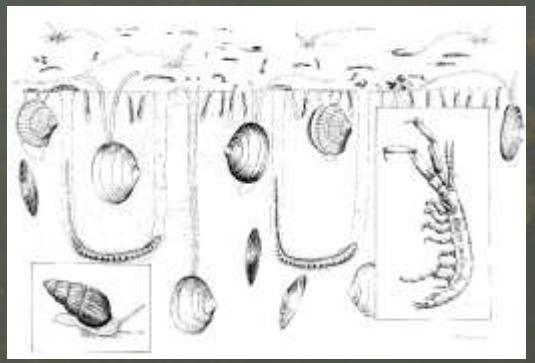
Figure: Mosselman (2012)

So what?

the societal challenge is a balancing act

but is stakeholder depended!

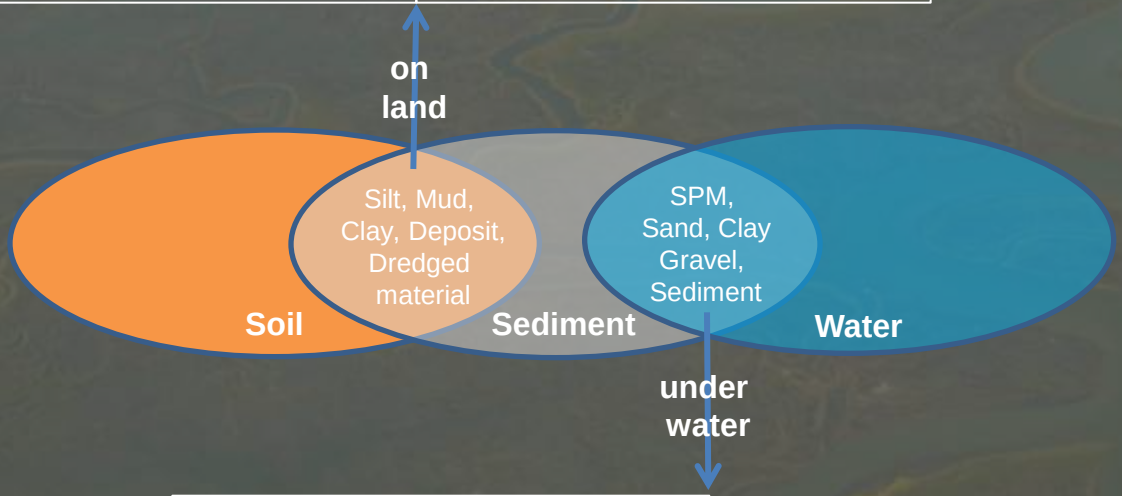
Too much sediment	Too little sediment	Sediment as resource
Obstruction of channels Rivers fill and flood Reefs get smothered Turbidity	Beaches erode Riverbanks erode Wetlands are lost River profile degradation	Construction material Sand for beaches Wetland nourishment Soil enrichment Habitat and food for life



Source scheme: Martin, 2002

So what?

Too much:	Too little:
•Limits land-use options •Undermines infrastructures •Disturbs habitats and thus also ecology	•Shrinks deltas and reduces formation of new land •Leads to eroding beaches and thus increases flood risks •Decreases soil fertility •Decreases habitat diversity and thus also biodiversity



Too much:	Too little:
•Disturbs habitats (turbidity, smothering) and thus ecology •Hinders navigation •Decreases discharge & reservoir capacity so increases flood risks and reduces power production •Undermines infrastructures	• Decreases habitat diversity and thus also biodiversity • Hinders navigation • Undermines infrastructures • Leads to a shortage of materials • Decreases amount of food for life (e.g. fish) in water

Too much sediment: turbidity

Scientific evidence so far indicates:

Excessive fine sediment loadings delivered to rivers from a variety of sources including agriculture have detrimental impacts on aquatic ecology and thereby degrade the ecological status of freshwater as well as estuarine and marine environments

A river in Tuscany, Italy. Picture: J. Brils

Picture source: animals.pawnation.com

Too much sediment:
some more examples

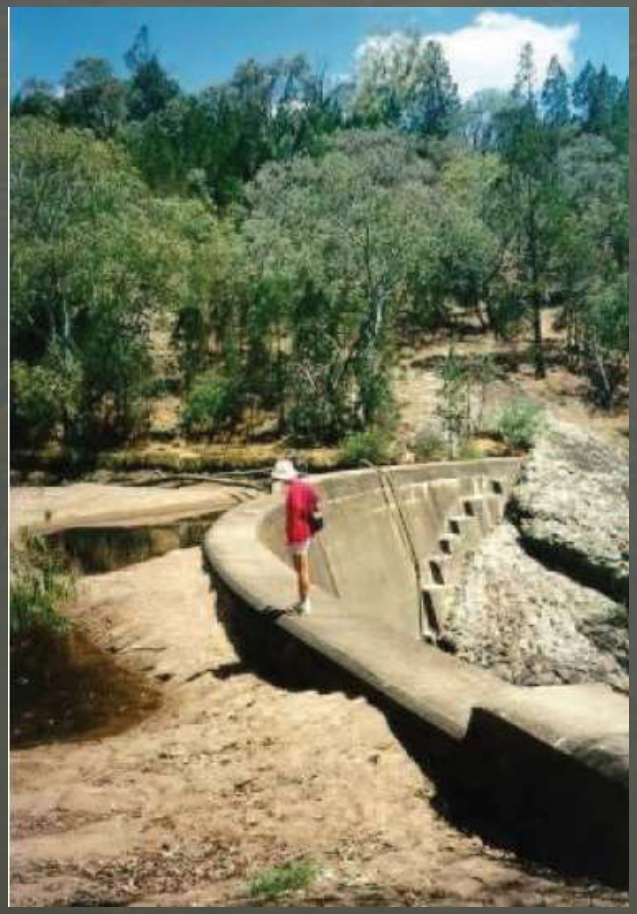


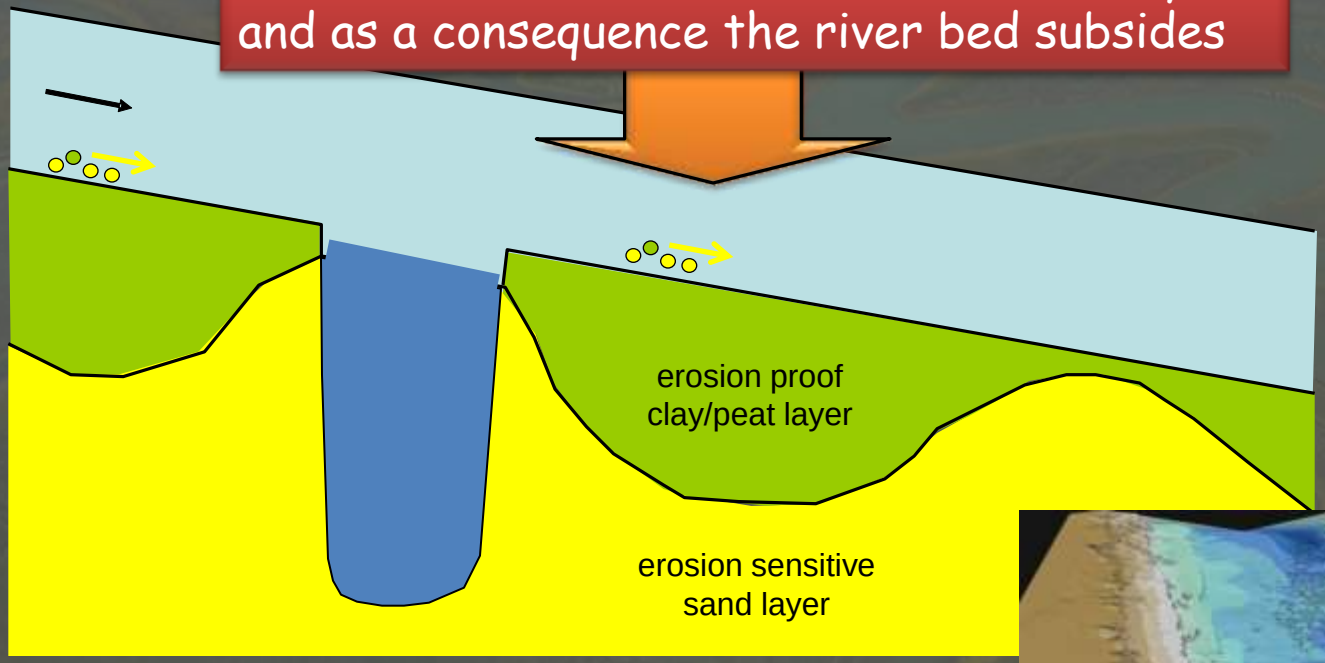
Photo: Chanson, 1998

Photo: IWHW

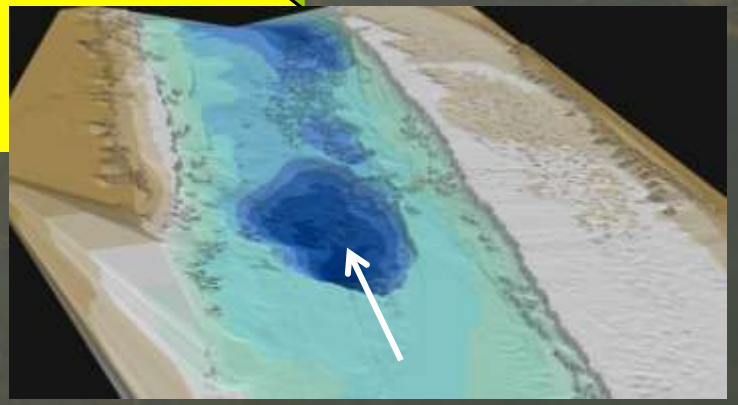
Photo: D. Hering

Too less sediment:
river profile degradation

Erosion: water flow flushes sediment away and as a consequence the river bed subsides



Source: Erik Mosselman



Sloff (2012) Veiligheid in de Rijnmaasmonding. Symposium "Deltawater, nu en later", 12-01-2011

Too less sediment:
river profile degradation

Marchland Levee in Louisiana, VS, 1983

… and this may happen thereafter

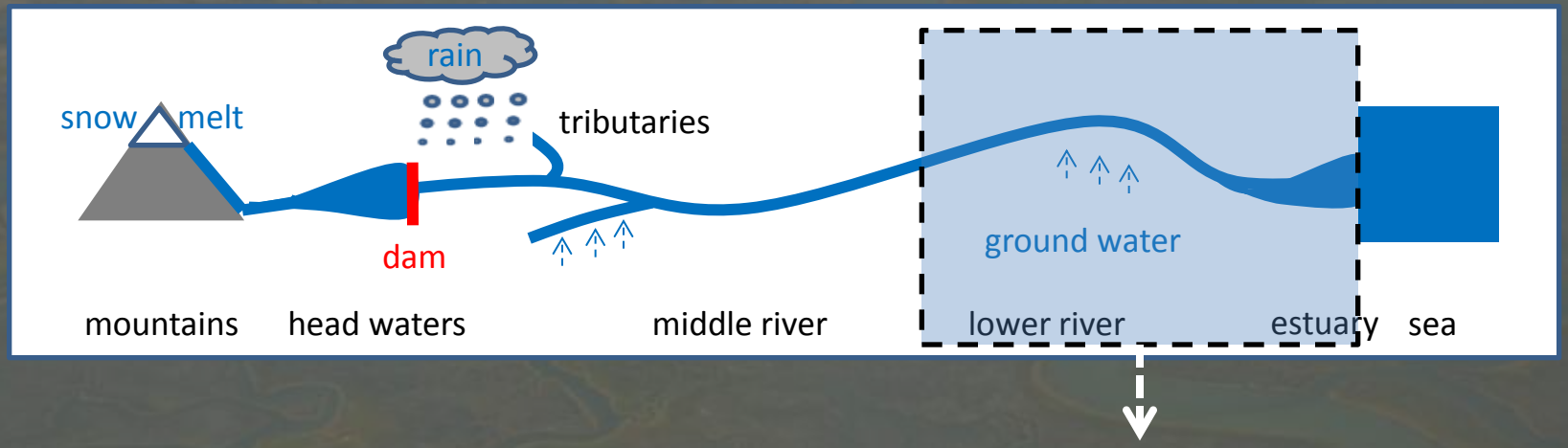
Sloff (2012) Veiligheid in de Rijnmaasmonding. Symposium "Deltawater, nu en later", 12-01-2011

Too less sediment:
river profile degradation

… and this may also happen thereafter

Habersack (2017) SedNet - Effective river basin management needs to include sediment, Brussels, 30 May 2017

What next?

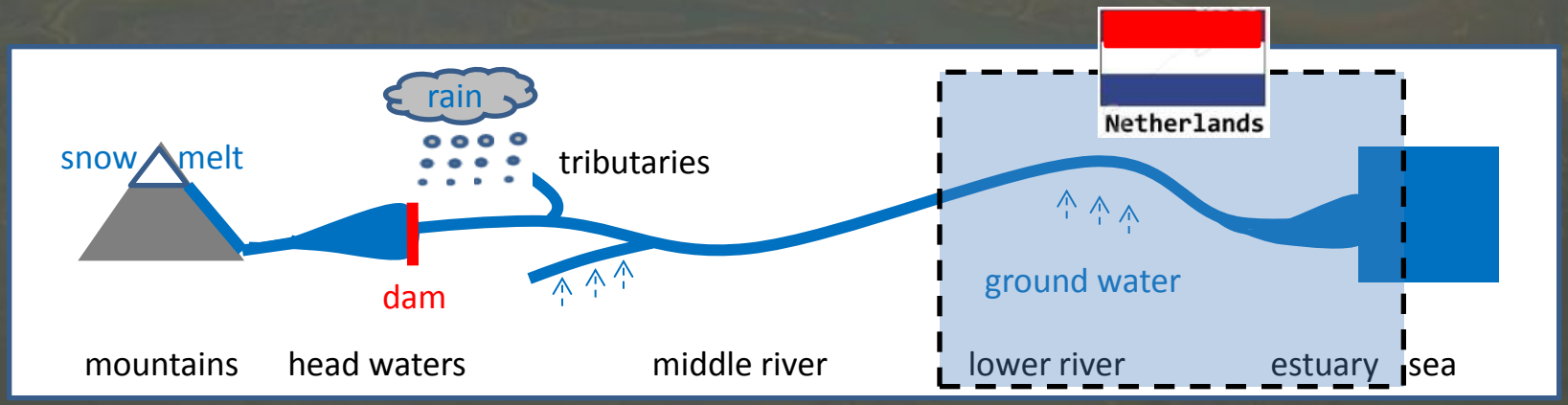


Discussed in workshop October 4th, 2016 among NL representatives of:

- River managers
- Port authorities
- Policy makers
- Navigation sector
- Gravel miners
- NGO's
- Universities
- Knowledge institutes
- Consultants

Outcome

- Sediment balance disturbed in NL rivers: Rhine, Meuse, Scheldt, Ems
- But not easy to decide what is good or bad balance: depends on desired use
- Lot of research activities ongoing NL & > NL, also targeted to solutions
- But solutions mostly focused ‘end-of-pipe’
- While sustainable solutions should be found at ‘river-sea-system scale:



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Thank you for your attention

Session wrap up

- Sediment balances disturbed in many river-sea systems, globally
- This has huge impacts to people, profit and planet
- A lot of research activities ongoing, also targeted to solutions
- But no concerted action yet
- A **dedicated SedNet working group** may help?

Discussion topics

- Agree on the wrap up?
- What is missing? Social engagement , time scale(s) coupled to sediment balance
- Worthwhile to **set up a SedNet sediment balance working group?**
- Suggestions for this working group:
  - Objective ?
  - Participants (whom of you wants to join)?
  - Activities?
  - Products? Come up with set of case studies and solutions Comunnicating practices and solutions
  - Planning?

Note: discussion can be continued/concluded Friday afternoon

Discussion topics

- Thomas Hoffmann Federal institute of Hydrology
- Jols Brils
- Jens Boelscher Berlin free university
- Luca Sittoni Ecoshape
- Katherine Cronin
- Edward van Keer
- Arjan Wijdeveld
- Pieter de Boer RWS
- Mathias Kondolf
- Elmert de Boer
- Marco Wensveen Haven Rotterdam
- Albert Oost
- Ad van der Spek
- Ewa Szalinska van Overdijk


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