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ICOLD
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90TH ANNUAL
MEETING



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ANNUELLE



Sediment Transfer

ICOLD TC J – “Sediment Bypassing and Transfer”

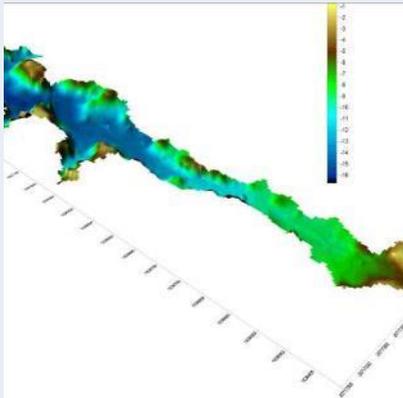
Dr Michael Detering

May 28th, 2022

This presentation contains information subject to copyright and issued patents.

Cost efficient and permanent solution of sedimentation problems

Areas of work:



**Consulting, Analysis,
Bathymetry**



**Sediment Solutions
of any size**



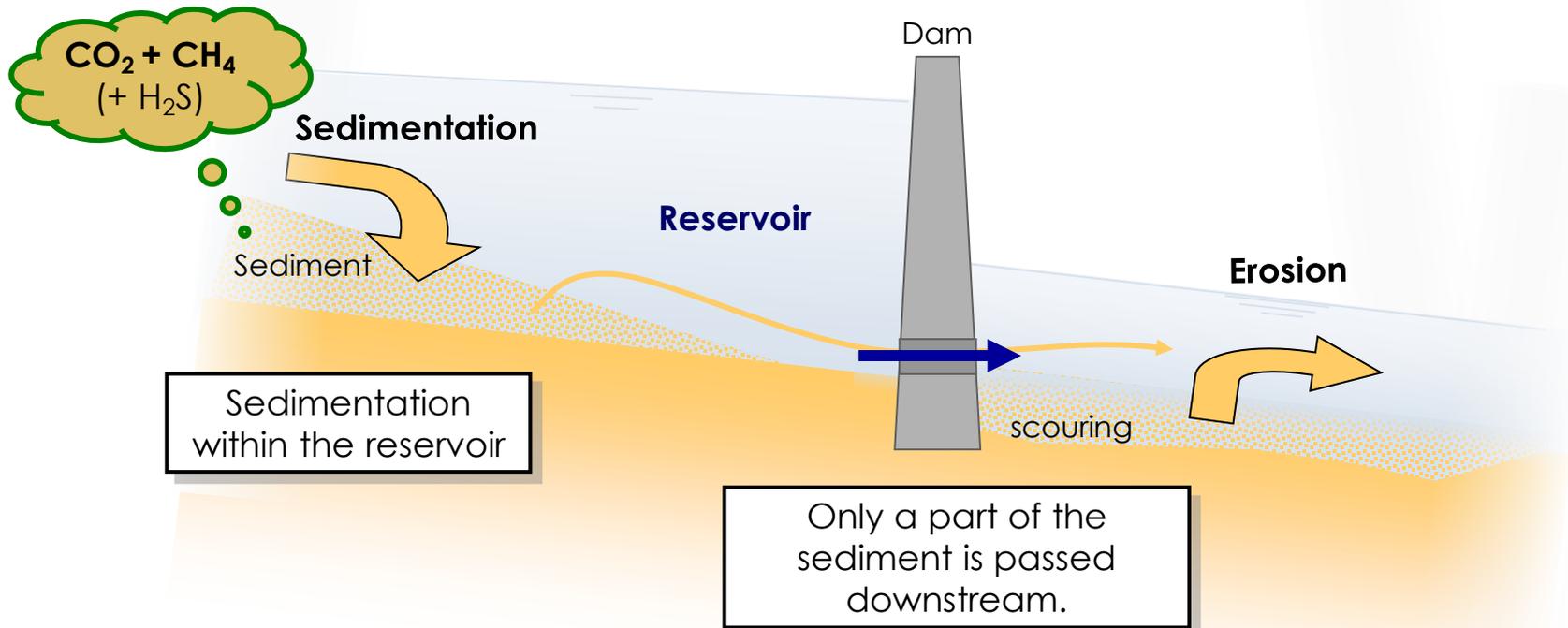
**Research &
Development**



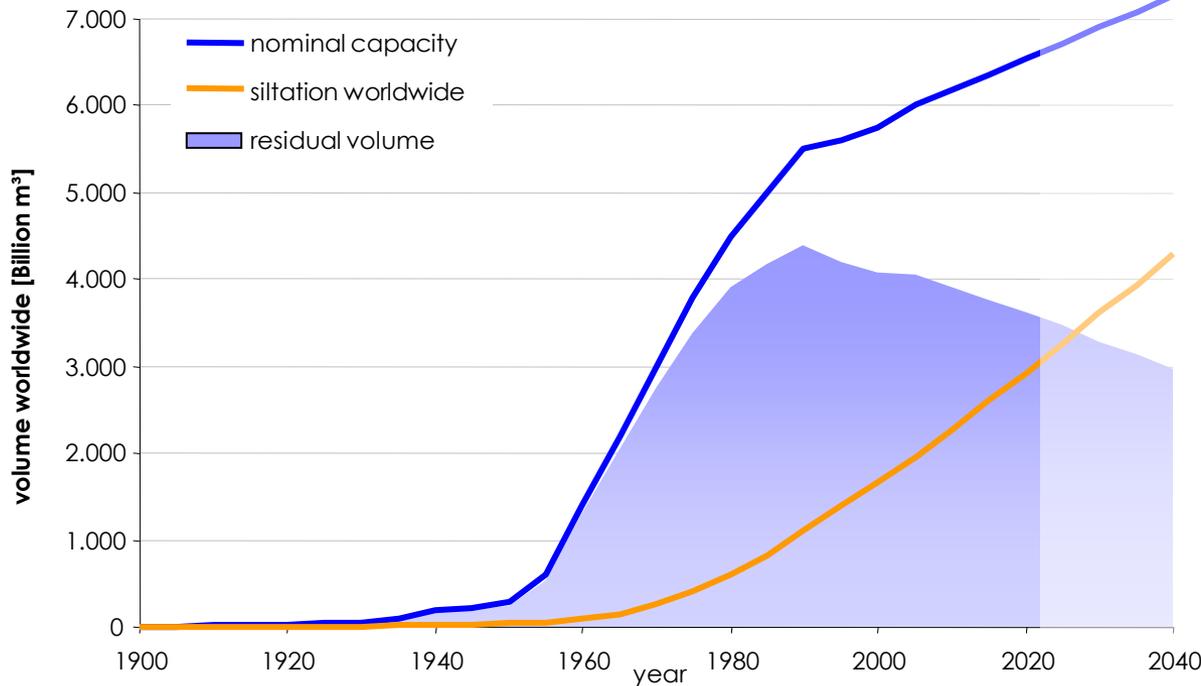
**Trainings &
Assessments**

Dams have been built for good reason, but cause massive changes in hydro morphology.

1. Reservoirs hold back sediment, thus reduce their own usable capacity.
2. Sediment is missing downstream, causing erosion and other damages.
3. Green house emissions are becoming an additional issue.
4. Sediment solutions have not been considered on most dam constructions.



Dimension of siltation is massive, threatening reservoir capacity and sustainability.



Worldwide more than 200,000 reservoirs, thereof more than 45,000 large dams

World Bank: “Last century was used to build reservoirs. This one will be used to solve sediment problems.”

sources: DB Sediments; Jolanda Jenzer, Giovanni De Cesare: *Möglichkeiten und Anwendung einer Datenbank bezüglich der Stauraumverlängerung von alpinen Speichern*, Wasser Energie Luft, 2006, Heft 3

Typical solutions differ in perspective and effects

alternatives in handling sedimentation of reservoirs

„do nothing“



- mid-/long term loss of reservoir
- potential danger to dam by additional sediment load
- summer oxygen deficit with downstream effects

Sediment Continuity



- reservoir / river preservation
- adaptive / continuous sediment continuity
- according to EU-WFD
- sustainable

Excavation / classical dredging



- reservoir emptying on dry excavation or expensive sediment dewatering required
- environmental impact, not sustainable
- often economically not viable
- execution risks (sediment slides etc.)

Sediment Basics

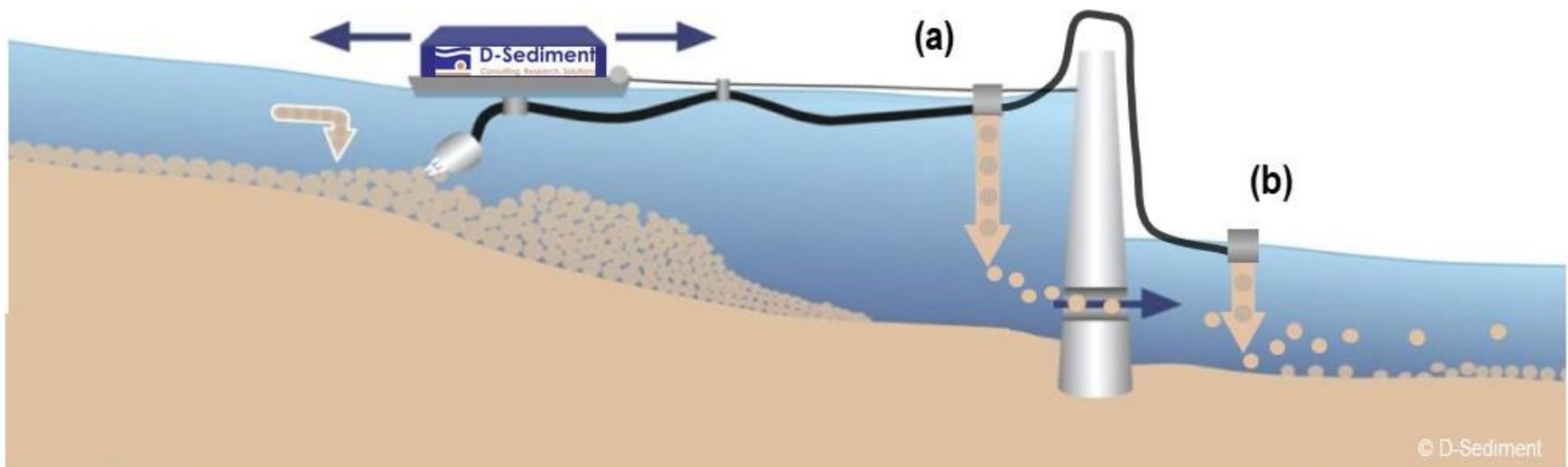
effects of flushing / uncontrolled release



Continuous Sediment Transfer

ConSedTrans – a near-nature solution

- Sediments are sucked in - similar to suction dredging - **but controlled, adjustable** to downstream flow/transfer capacity and on a fully automated 24/7 basis, being **environmentally friendly**.
- Dredging technology differs from conventional equipment.
- Automated transfer to drop zone with no harm to turbines (a) – or direct downstream passage (b)
- Efficient, comparably small and virtually **unlimited range** by booster pumps, **no or limited water loss**
- **NEW: “Harvesting” and use of methane/GHG emissions.**
- Valid patent protection in many countries



Sediment Transfer equipment options: several of technology with different characteristics

SediMover



- bulk transfer on more even reservoirs with limited debris
- works with cutter, jet or both combined
- sediment size up to 40mm (1,5") or 100mm (4") depending on equipment
- manifold data processing options

MiniMover



- able to work
 - with/among debris
 - in narrow space
 - on smaller budget

Sediment Transfer equipment options: several of technology with different characteristics

SediMover



MiniMover



Both technology lines are

- of modular design and capable of sediment transfer downstream, ashore treatment and/or disposal,
- scalable to significantly larger dimensions and/or work with multiple vessels,
- able to operate manually or automated with remote access,
- very efficient on equipment utilization by 24/7 operation
(dimensions, pumps, hoses, pipes, power requirements, cables, weight, transport, installation, ...)

Sediment Transfer equipment options: robust and proven design for coping with challenges

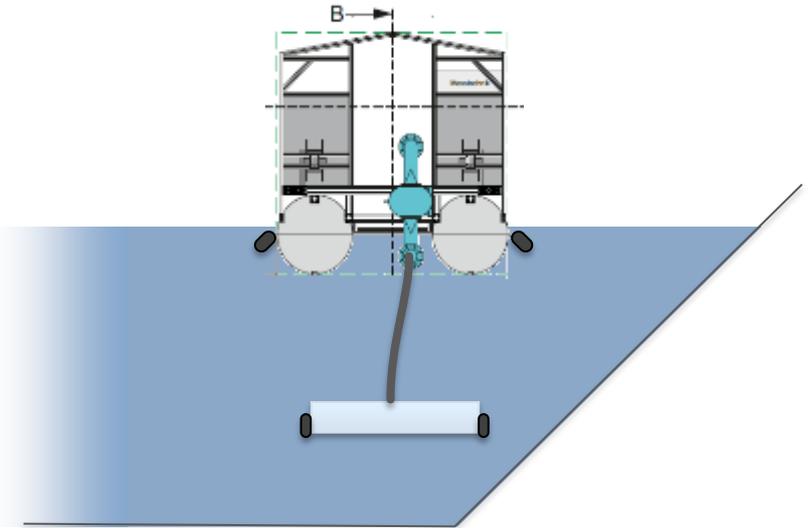
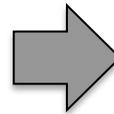


- frequent floods with strong currents
- frequent dry fall (flood protection)
- heavily consolidated/dense sediment
- very shallow sections
- debris
- plant growth
- power limits
- difficult reservoir access
- booster pump due to transfer distance > 1 km
- remote site/long travel
- ...

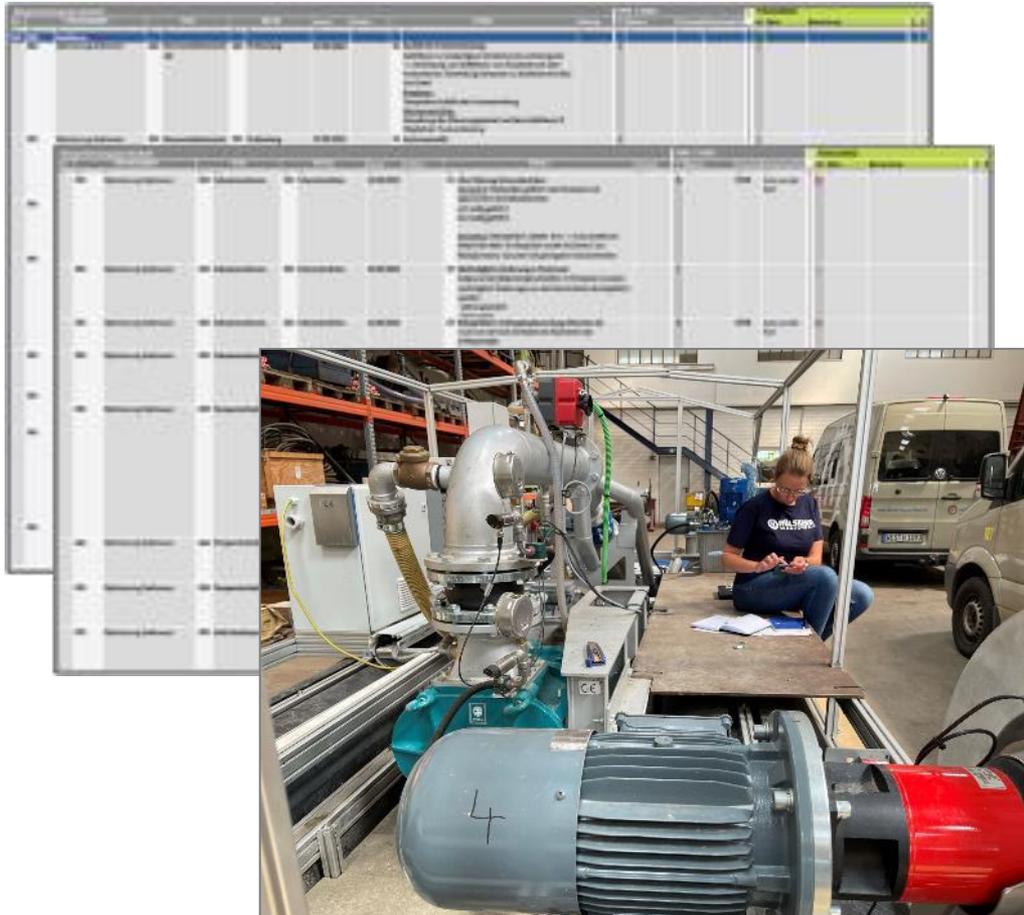
Sediment Transfer equipment options: ability to operate in varying conditions

including hydro suction but also

- optional (multiple) booster pumps for unlimited range
- easy to install at different reservoir access and bank shape
- fits into 20'-containers

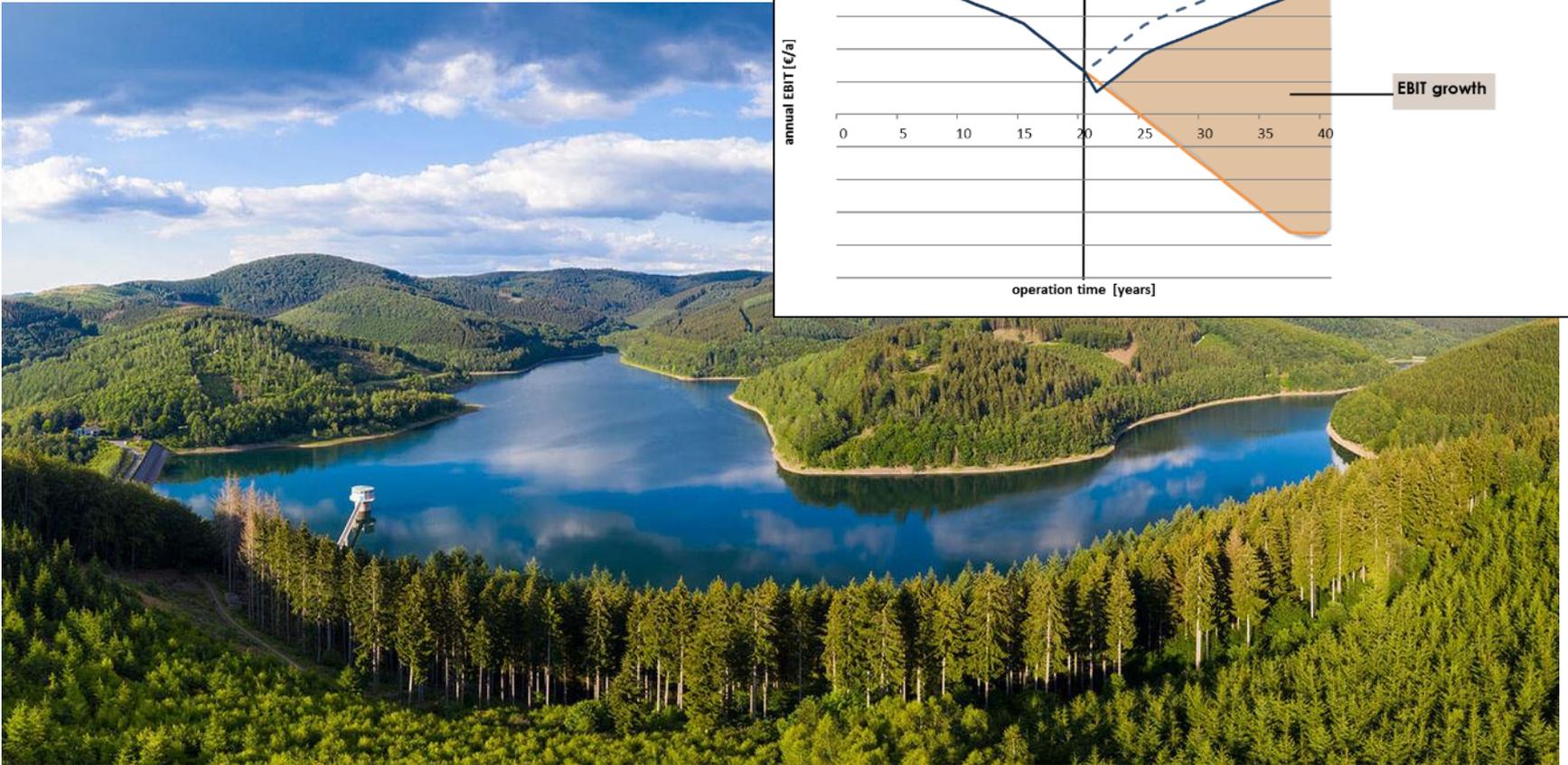
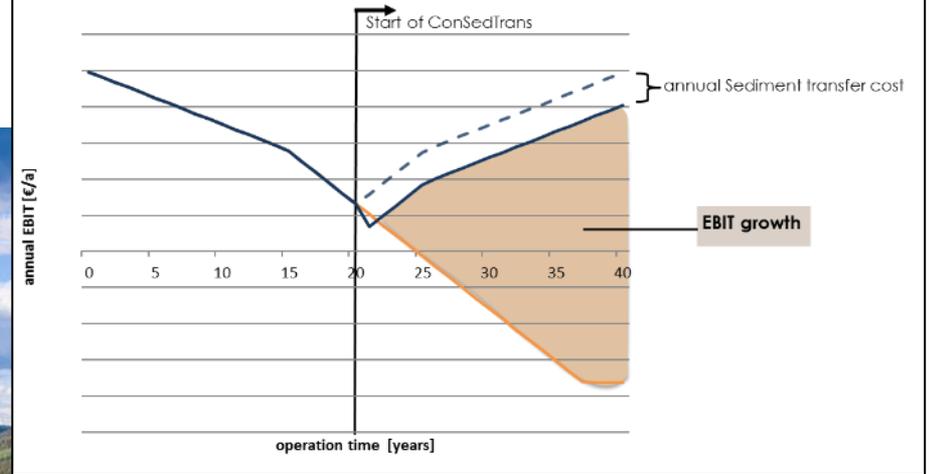


Sediment Transfer equipment options: patent protected state-of-the-art design incl. certifications



Equipment application: gaining back asset value

Gain back asset value:



Sediment Transfer application: core characteristics

- **cost efficiency by autonomous operation**, no changes on civil structures
- **sustainable and most environmentally friendly operation**
- **restore asset value** for dam/reservoir operators – far cheaper than dredging or new build
- **online process measurement and data provision** to customer & environmental agencies
- **patent protected** with fair licensing, including professional support
- **proven equipment easy to install**
- **easy to combine with other equipment**, booster pumps, hydro suction, manual components, bypass tunnel operation ...
- **Any questions?**

Thank you



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