Sustainability assessment for decentralized water treatment technologies

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SPIEGL Wasseraufbereitung

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The importance of sustainability assessments in general (Definition)

Sustainability assessment describes the "process by which implications of an initiative on sustainability are evaluated".

Pope et al. (2004)

Multi-criteria evaluation deals with the difficulties of complex decision-making processes handling a large data amount; Can be used to identify a single most preferred option, to rank options, to assess sustainability aspects of initiatives, etc.

Dodgson et al. (2009)

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The importance of a sustainability assessment in the WaKap context

- Identification of possible effects of WaKap solutions on sustainability aspects and limits of applicability.
- Contribution to the transferability of the results to other cases and regions.
- Alignment of the criteria with the Sustainability Development Goals (UN-SDGs).

Steps to be taken in a sustainability assessment

- Development of an adapted criteria catalogue.
- Comparison of the evaluation criteria and results with the objectives of the Sustainable Development Goals.
- Data collection (incl. on-site research and interviews) as well as cross-checking data.
- Validation of the results → if necessary, adjustment of the criteria catalog for further evaluation cases.
- Evaluation of the individual processes and the overall system.
- Derivation of optimization possibilities, relevant aspects for transferability to other applications, and boundary conditions.

Selected categories for a sustainability assessment of water treatment technologies

- Ecologic criteria
- Safety-relevant criteria
- Economic criteria
- Social criteria
- Technical criteria

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Criteria catalogue for the sustainability assessment in the WaKap context

Ecological criteria	Safety-relevant criteria	Economic criteria	Social criteria	Technical criteria
Ecotoxic substances (in water)	Germ infestation/hygiene	(Net) costs	Convenience (service quality)	Drinking water/drinking water quality
Greenhouse gas emission	Smell/turbidity	Flexibility, system's readiness for change	Economic burden	Vulnerability to damage
Resource use		Profitabilty (project economics)	Nuisance	Effect of system failure
Energy efficiency		Employment (economic effects)	Social legitimacy and public acceptability	Flexibility w.r.t. changing conditions
Land use		Operating and maintenance costs	Effects on land and resource use	Dependency from other infrastructure
Waste generation			Society and consumer: political legitimacy	Durability and possibilities of maintenance
Water footprint			Society and consumer: affordability	Security of supply
			Equity between socio-economic groups	Security of technology
			Participation, technology transfer	Ability to cope with climate change

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Link to the Sustainable Development Goals

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Conducting the sustainability assessment in the WaKap context

DATA TO BE COLLECTED

- For some sustainability criteria, information is already determined by the chosen technology and the size of the system (e.g. energy requirements and economics).
- Data on other criteria has to be collected, e.g. by means of interviews with the affected community or other stakeholders (e.g. public acceptability and usage) and may be subject to change over time.

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Status Quo and Next Steps

STATUS QUO

- Development of a criteria catalog ✓
- Data collection (on-site research and interviews) and data check for the first pilot location at the Pagoda in Chợ Vàm, province An Giang
  - Technical, safety-relevant and economic data ✓
  - Social and ecological data (partly ✓ and ongoing)
- Alignment with Vietnamese partners (ongoing)

NEXT STEPS

- Validation of preliminary results through a refined evaluation
- Extension and adjustment of the criteria catalog for further pilot plants
- Data collection at other pilot sites

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Establish Sustainable Business Models for the WaKap case

SUSTAINABLE BUSINESS MODEL (BM)

- Concept of the organisation's value proposition, creation, delivery, capture and exchange, realized in collaboration with stakeholders.

RESEARCH QUESTIONS

- Design of BM to enable the base and middle of the pyramid in the Vietnamese emerging market to gain access to safe drinking water

PRELIMINARY RESULTS

- Advanced regulatory framework
- Local value chain members lack skills and expertise
- Importance of local partners and intermediaries

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