Effective governance for the successful long-term operation of local scale wastewater systems

Findings and Recommendations: A synthesis report for key stakeholders in community scale sanitation in Indonesia

PROJECT SYNTHESIS

COMMUNITY
SANITATION
GOVERNANCE

ABOUT THE AUTHORS

The *Institute for Sustainable Futures* (ISF) was established by the University of Technology Sydney (UTS) to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment, human well-being and social equity. We seek to adopt an inter-disciplinary approach to our work and engage our partner organisations in a collaborative process that emphasises strategic decision-making. Our projects foster lasting change and we aim to build independent capacity in our clients by passing on knowledge and skills. We focus on innovation and our research often extends sustainability practice and contributes to current thinking.

Introduction

This brief document is written for key stakeholders and decision makers with purview of sanitation services in Indonesia. It provides the main findings and recommendations of a research project to better understand and improve governance for enabling long-term provision of local scale wastewater services.

> **Local scale wastewater services** refer to *sanitation services that utilise local scale infrastructure* (services that collect wastewater from 50-200 households and treat wastewater locally/close to where it is produced). Such services have historically been referred to as 'community' systems. Local scale wastewater services in Indonesia are predominantly delivered by *KSM* and *KPPs* (community based organisations, CBOs) who are responsible for operation and maintenance of the local scale infrastructure – a model commonly known as SANIMAS.
>
> The terminology of 'local scale' is introduced to separate the scale of technology from the locus of responsibility for operation and management. Our intention is to make clear that local scale wastewater services may be managed by various entities, including communities via KSMs/KPPs, but also by other public and private stakeholders, alone or in combinations that fit the local context.

Effluent management in dense, low-income urban areas in Indonesia is challenging. Local scale services are an affordable way to manage the public health and environmental hazards of untreated wastewater. However, these systems need effective governance to operate in the long-term. Reviews of the management and performance of SANIMAS systems found that effective governance is difficult to achieve and the services do not always last. Although the SANIMAS approach is being rapidly scaled up, local government capacity for support is often weak. To ensure services are sustained in Indonesia, it is critical to identify improved models of governance at the local level, and to strengthen capacity in community, local government, the private sector, and sector associations to implement these models.

To help improve this situation, the Institute for Sustainable Futures (ISF) at the University of Technology Sydney (UTS) developed a three-year (2014-2016) transdisciplinary action research project to improve the long-term governance of local scale wastewater services. It was conducted in partnership with the Indonesian Ministry of National Development Planning (BAPPENAS), and in collaboration with the Association of KSMs for sanitation (AKSANSI), the German NGO BORDA, the Center for Regulation Policy and Governance at Universitas Ibn Khaldun Bogor and UK development think tank, the Overseas Development Institute (ODI). The project took a mixed methods approach, collecting data from and generating shared insights at all levels of responsibility - national government (six Ministries), local governments (11 kabupaten and kota), and community (about 30 field sites).

A national Project Advisory Group provided guidance and validation for the research. This group comprised all six National Ministries concerned with sanitation (Public Works, Planning, Health, Environment, Home Affairs, and Finance), the five principal international programs concerned with sanitation (USAID IUWASH, World Bank WSP, USDP, ADB, IDB), and AKSANSI, the national NGO providing support to KSMs responsible for local scale systems. The project encompassed four areas of detailed enquiry within Indonesia:

Performance monitoring: What is the volume and quality of data for local scale system performance? How are systems performing?	**Legal arrangements**: What are the legal and informal arrangements for local scale system governance, and what are the implications for O&M?	**Scale and distribution of costs:** For a range of sanitation service delivery models, what are the scale and distributions of costs; and what are the implications?

Management partnerships: What are the range of structures and institutional arrangements that could deliver the responsibilities for managing local scale systems?

This brief document serves the purpose of an 'executive summary' of the project with the main findings and recommendations presented for an audience of key stakeholders. The high level evidence behind the findings can be found in our *Visual Synthesis Report*. The details that underpin the findings can be found in the five Research Papers and the Waterlines journal paper listed in the Project Outputs section of this document, and available from the project website (http://communitysanitationgovernance.info).

Main Findings

In Indonesia currently, with respect to local (also known as decentralized, community or SANIMAS) scale sanitation service provision:

1. It is unknown whether local scale systems are performing adequately for public health outcomes because very little **monitoring** occurs in practice.
2. SANIMAS services face many **challenges**, arising from situational and capacity limitations of community-based organisations (CBOs).
3. There are compelling legal, institutional, equity, and normative **reasons** for local governments (i.e. kabupaten and kota) to act on their responsibilities and increase their participation.
4. Local governments are legally able to provide **funds** and other support for the operation and maintenance of local scale sanitation assets they do not own.
5. Some local governments already provide financial and/or legal **support** to local scale sanitation systems. This support is sometimes well-directed.
6. Several barriers limit local governments' ability to provide support.

The mind map in Figure 1 provides the headlines behind each of the main findings. The evidence is summarized in the *Visual Synthesis Report*, and explored more fulsomely in the five Research Papers and Waterlines journal paper. See the Project Outputs section of this document for more details on these other outputs.

Principal Recommendations

The principal recommendations are summarised as follows and explained briefly in the pages that follow:

1. Local government should take ultimate responsibility for ensuring local scale sanitation services are delivered and sustained. National government could set minimum requirements for local government.
2. Policies and programs should reflect all domains of governance necessary to sustain local scale sanitation services: functioning technology, sustainable financing, effective management, and sustained demand.
3. National government and donors should use the Pathogen Hazard Diagram as a thinking tool to help direct program design and investment towards improved health outcomes.
4. Local governments should use the Governance Spectrum to explore new models, identify local strengths and implement locally appropriate improvements to governance in their jurisdiction.

Additional recommendations for policies and programs

1. Require post-construction checks for systems from every local scale (SANIMAS) program.
2. Develop SPM (legal minimum service standards) that equitably encompass service quality for customers of all scales of sanitation services, and advocate for national sanitation regulation.
3. Consider cross-program evaluation of the main community-based sanitation programs (Regular, DAK, USRI) to embed the lessons of which design features lead to more successful ongoing operation.
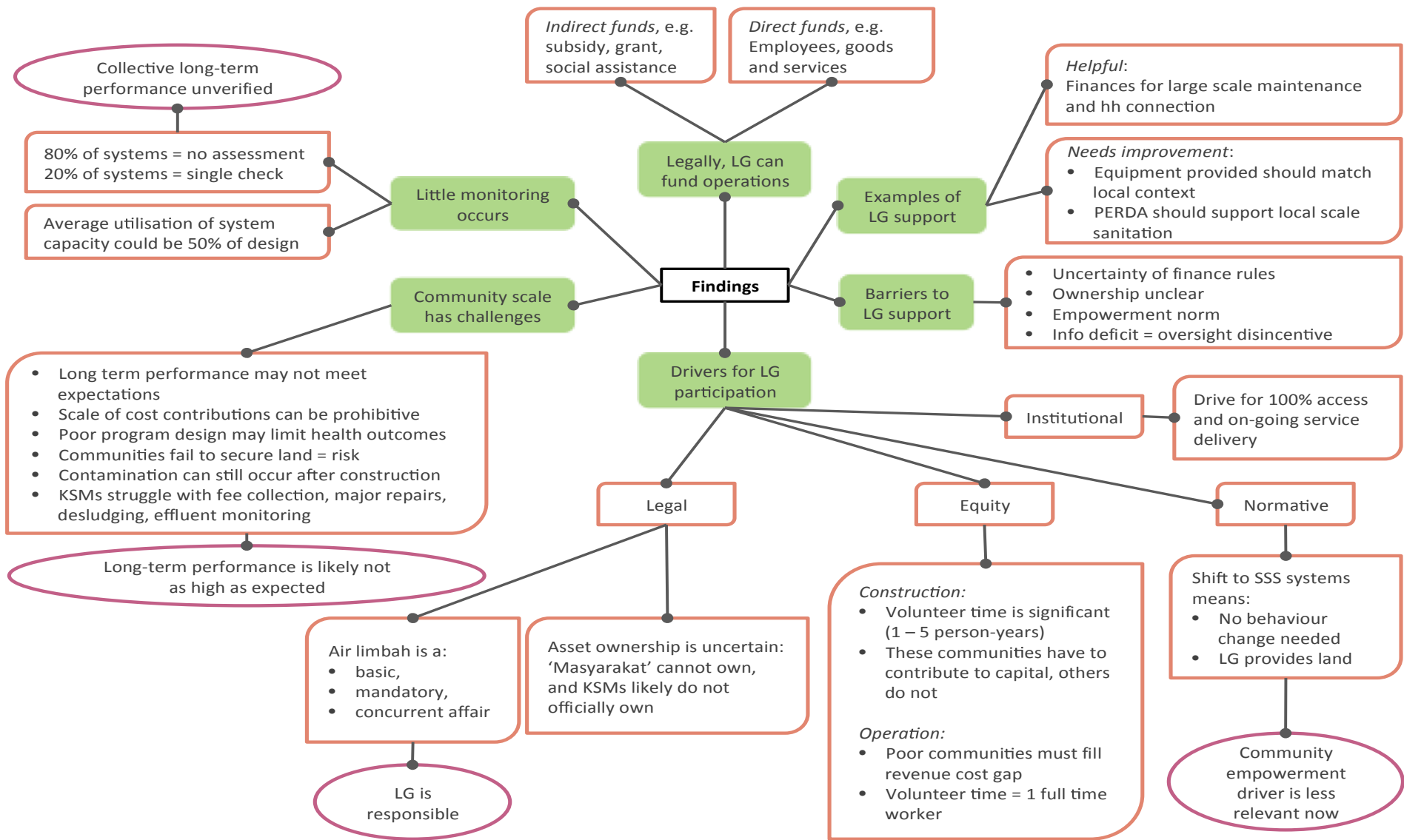
Findings

- Collective long-term performance unverified
  - 80% of systems = no assessment
    20% of systems = single check
  - Average utilisation of system capacity could be 50% of design
  → **Little monitoring occurs**

- **Legally, LG can fund operations**
  - *Indirect funds*, e.g. subsidy, grant, social assistance
  - *Direct funds*, e.g. Employees, goods and services

- **Examples of LG support**
  - *Helpful*: Finances for large scale maintenance and hh connection
  - *Needs improvement*:
    - Equipment provided should match local context
    - PERDA should support local scale sanitation

- **Barriers to LG support**
  - Uncertainty of finance rules
  - Ownership unclear
  - Empowerment norm
  - Info deficit = oversight disincentive

- **Community scale has challenges**
  - Long term performance may not meet expectations
  - Scale of cost contributions can be prohibitive
  - Poor program design may limit health outcomes
  - Communities fail to secure land = risk
  - Contamination can still occur after construction
  - KSMs struggle with fee collection, major repairs, desludging, effluent monitoring
  → Long-term performance is likely not as high as expected

- **Drivers for LG participation**
  - **Institutional** → Drive for 100% access and on-going service delivery
  - **Legal**
    - Air limbah is a:
      - basic,
      - mandatory,
      - concurrent affair
      → LG is responsible
    - Asset ownership is uncertain: 'Masyarakat' cannot own, and KSMs likely do not officially own
  - **Equity**
    - *Construction*:
      - Volunteer time is significant (1 – 5 person-years)
      - These communities have to contribute to capital, others do not
    - *Operation*:
      - Poor communities must fill revenue cost gap
      - Volunteer time = 1 full time worker
  - **Normative**
    - Shift to SSS systems means:
      - No behaviour change needed
      - LG provides land
      → Community empowerment driver is less relevant now

Figure 1: Mind map of findings (Mitchell et al 2016)

Principal Recommendations

1. **Local government should take ultimate responsibility for ensuring local scale sanitation services are delivered and sustained. National government could set minimum requirements for local government.**

Local governments are responsible for sanitation under Indonesia's decentralised structure. For local scale services in practice, however, ultimate responsibility rests with the KSMs and communities who receive this infrastructure. Local governments' legal responsibility is clear, nevertheless, because sanitation is legally defined as an obligatory service (i.e., it is concurrent, a basic service, and a mandatory affair) (urusan wajib).

National government can create drivers for local governments to take responsibility, by setting clear minimum requirements on local governments. Our research suggests three key areas where local government can and should meet minimum requirements (illustrated in Figure 4):

(i) **Monitoring**: Maintain up-to-date records that track the performance of all local scale systems within their jurisdiction, including current records of post construction checks and each system location, the performance status of the technology (Is the system functioning as expected? Is there any major damage?), effluent quality, and the performance status of the management (Is there an operator? Are collected fees sufficient to cover expenses?).

(ii) **Funding**: Provide funding for specific major costs, including: effluent monitoring, desludging, rehabilitation, extension, retrofitting shared public systems to simple sewer systems. Most KSMs are not able to collect sufficient fees to cover monthly operational costs, let alone major and significant costs required for successful operation.

(iii) **Tariff setting and fee collection**: Formalise or authorise tariff setting and fee collection mechanisms to enable sustainable financing of services. Many KSMs struggle financially. Providing authority and legitimacy for KSMs or local leaders at village, neighbourhood, or regional level to (a) set tariffs at operational cost-recovery level and (b) formalize fee collection processes, is an essential step. It could happen through local regulation.

Our costing analysis (Mitchell et al. 2016) showed that *per household* operating costs for SANIMAS systems that include a community sanitation centre are similar to those for centralised services when the time required in volunteer labour from SANIMAS communities is valued at standard government rates. Operating costs for SANIMAS simplified sewer systems are lower, but not negligible.

Both scales of sanitation services experience shortfalls between revenue and costs. For centralized services, local governments appear to meet the shortfall in revenues from fees and tariffs. For local scale services, shortfalls appear either to remain unmet so systems do not function properly, or individuals donate additional funds and/or time to meet shortfalls.

A national policy or guideline explaining the benefits of formalizing tariffs and fee collection mechanisms specifically for local scale sanitation systems would support local bureaucrats and politicians in overcoming perceived barriers to supporting sanitation service provision. Such a document could show how to calculate a tariff that is affordable and that covers actual local operational costs, including wages for local scale operators and administrators. Preliminary investigation and analysis in this project shows both willingness and financial ability to pay a monthly sum per household that covers all operational costs. While actual costs should be covered, every tariff system needs to ensure that no household is left behind. Supporting local governments to formalise tariffs and fee collection would improve public health outcomes alongside improving efficiency and effectiveness of existing and new investments.

Each local government could then formulate its own path beyond these minimum requirements, in collaboration with local stakeholders. Our Guidance Materials (see Project Outputs) provide many different strategy examples that can be adapted to local needs and opportunities (see also Recommendation 4).

2. Policies and programs should reflect all domains of governance necessary to sustain local scale sanitation services: functioning technology, sustainable financing, effective management, and sustained demand

Our Global Practice Scan suggested, and our subsequent investigations confirmed, that for local scale systems to deliver sanitation services over the long term, four distinct but overlapping domains of governance require attention. These constitute the 'what' of governance; later recommendations focus on the 'how' of governance (Ross et al, 2014).

Functioning technology: Ensuring the physical system delivers the service	**Sustainable financing:** Sufficient ongoing revenue to cover all short and long-term operational cost elements	**Effective management:** Accountable and equitable administration and decision making system	**Sustaining demand:** Maintaining effective community demand for the service over time

Figure 2: The domains of local scale sanitation governance

Framing these domains of governance in terms of outcomes, they are: functioning technology, sustainable financing, effective management, and sustaining demand. The intention of this characterisation is that it focuses first and foremost on local scale sanitation service systems. There are other elements of and influences on local scale governance. Some form part of the context within which these domains are enacted, such as legal and institutional arrangements. Others go across all of these domains, such as human resource management.

Local government regulations, policies, and guidelines should consider the operational phase and reflect all four domains.

National programs from the Government of Indonesia and donors should consider the operational phase, and reflect all four domains.

3. **National government and donors should use the Pathogen Hazard Diagram as a thinking tool to help direct program design and investment towards improved health outcomes. (see Mitchell et al, 2016, Waterlines)**

Across the globe, our commonly used wastewater treatment technologies are designed to remove organic/chemical contaminants, and are limited in their removal of disease-causing microorganisms, or pathogens. The liquid effluents deliberately and accidentally discharged to the environment go largely unnoticed and unmanaged, but can carry hazardous levels of pathogens. The Pathogen Hazard Diagram is intended to draw attention to this situation.

The Pathogen Hazard Diagram is a tool for mapping and tracking the extent of pathogen removal or inactivation in common wastewater treatment technologies/systems and identifying the scale of potential hazards to which people may be exposed. While there is little reliable location-specific pathogen data available, this thinking tool uses first principles and text-book data to help identify the potential for local hazards resulting from different wastewater treatment technologies.
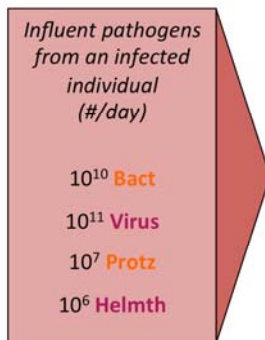
The example pathogen hazard diagram below (Figure 3) shows that a well-functioning septic tank emits large numbers of pathogens each day in its liquid effluent. The numbers of pathogens can significantly exceed the minimum infective dose, so where that effluent goes needs to considered carefully because of the potential for people being exposed to those pathogens that pass straight through the septic tank.

Therefore, the Pathogen Hazard Diagram can help identify where additional treatment is needed and where to focus local monitoring, and guide local sanitation investments towards technologies that reduce pathogen hazards and therefore improve public health.

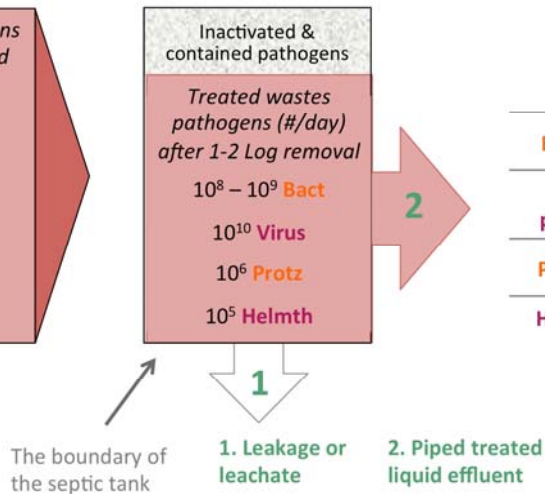# How to determine if further treatment is needed:

A) BEFORE TREATMENT:

How many pathogens are in the influent?

Influent pathogens from an infected individual (#/day)

10^{10} Bact

10^{11} Virus

10^{7} Protz

10^{6} Helmth

The boundary of the septic tank

B) AFTER TREATMENT:

How many pathogens are leaving daily in treated wastes (1, 2)?

Inactivated & contained pathogens

Treated wastes pathogens (#/day) after 1-2 Log removal

$10^{8} - 10^{9}$ Bact

10^{10} Virus

10^{6} Protz

10^{5} Helmth

2

1

1. Leakage or leachate

2. Piped treated liquid effluent

C) IN THE ENVIRONMENT:

How much do the remaining pathogens matter? What is the potential hazard, e.g. infective doses?

	What is the minimum infective dose?	What is the # of infective doses in treated wastes?
Bacteria	10^{2} - 10^{8}	Up to 100,000,000
Virus particles	10^{0} - 10^{1}	Up to 100,000,000,000
Protozoa	10^{0} - 10^{2}	Up to 10,000,000
Helminth eggs	10^{0} - 10^{1}	Up to 1,000,000

Figure 3: Pathogen Hazard Diagram concept, illustrated for the case of a well-sealed septic tank

National government and donors could use the Pathogen Hazard Diagram to strengthen technology choices by promoting technologies and programs that deliver better pathogen hazard reduction.

4. **Local governments should use the Governance Spectrum to explore new models, identify local strengths and implement locally appropriate improvements to governance in their jurisdiction. .**

As discussed in Recommendation 1, local government is legally responsible for sanitation service provision, which includes sanitation services of all scales: centralized, local and on-site. Therefore, at a minimum, local government should explore how to enact the responsibilities outlined above. The Guidance Materials (see Project Outputs) produced in this project set out a spectrum of governance arrangements for how both the minimum responsibilities and the many additional activities required for the successful operation of local scale services can happen in practice.

The strategies for improving governance that are adopted at any location will have the best chance of success if they are based on the unique strengths and needs of each site. There is a wide spread of diversity within local governments in terms of actors, capabilities, and intentions. Similarly, there is a large range of ability and ambitions, constraints and opportunities across the 14,000 Indonesian KSMs responsible for local sanitation service delivery. Therefore, any initiative that seeks to improve the governance of local scale sanitation systems must account for this diversity.

The Guidance Material provides ideas for how each local government area can select strategies for improving local scale sanitation governance based on their unique strengths and weaknesses. The Guidance Materials distinguish between situations where a public or private institution leads, where communities and local governments or other stakeholders collaboratively manage the systems, and where communities remain in the lead but receive basic support from local government These approaches are not mutually exclusive. The key thing is that a local government should work out what best meets their current needs and opportunities, identifying combinations of strategies from within one, two or all three of the Governance Spectrum approaches. A summary of the Guidance Material is provided below:
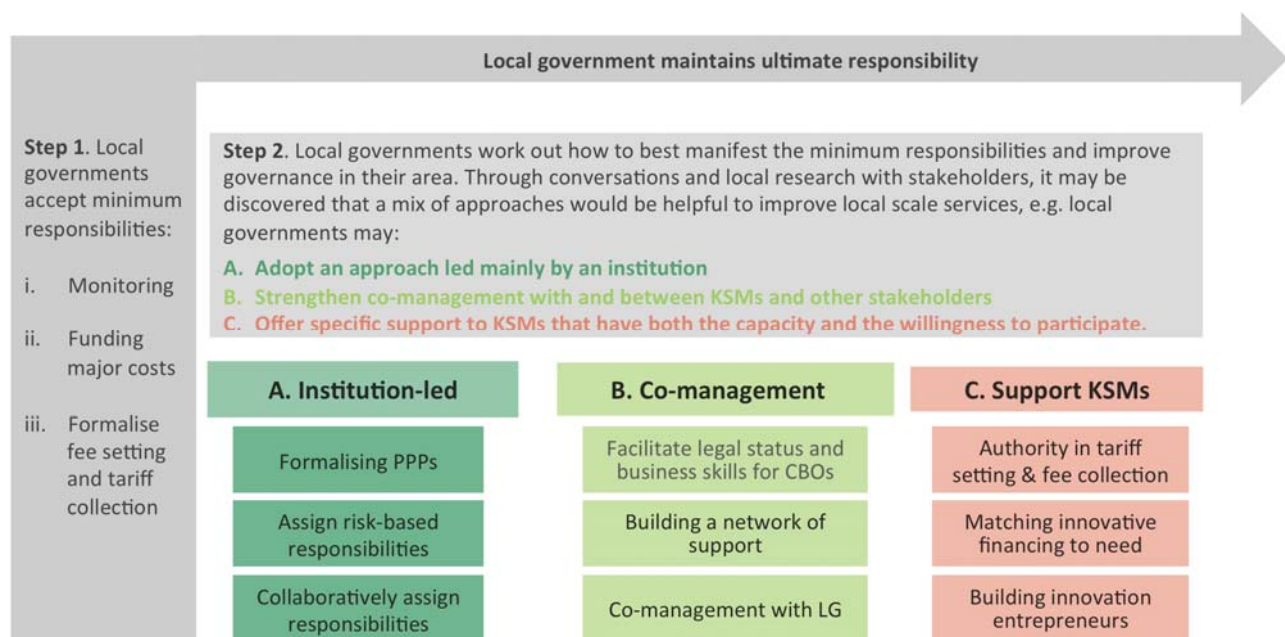

Figure 4 Guidance Material Summary showing proposed minimum requirements of and potential paths for local government to support the long term effectiveness of community or local scale sanitation

Institution-led approaches	
Formalising PPPs (public private partnerships)	There are numerous ways for local government to explore public private partnerships to deliver the **operational phase** of sanitation services for community or local scale systems. This may be relevant in areas where strong private sector exists, and local government is neither willing nor able to undertake all operation responsibilities. In Japan for example, there is an extensive network of thousands of licensed private organisations, providing operational and monitoring services for on-site and small scale sanitation systems.
Assigning risk-based responsibilities	Applying this strategy means assigning responsibilities according to levels of risk, by adopting and adapting international approaches such as from the USA, where the degree of human and environmental health risk determines the level of institutional involvement.
Collaboratively assigning responsibilities	This is process whereby local government leads a facilitated conversation with local stakeholders to revisit and reallocate the spectrum of responsibilities based on who is best placed to do what and when. It should include local private enterprises, local government departments, local NGOs, and CBOs. This strategy allows each local government to strengthen governance based on the strengths in their region. Our Governance Game can help with this in practice.
Co-management approaches between Local Government KSMs, NGO, private sector	
Facilitate legal status and business skills	Local government and designers of local scale programs can strengthen KSMs by facilitating their legal status and/or developing their business skills. This can help achieve security of the land, asset, as well as improve the ability of the KSM to access funds.
Building networks	Creating regional or provincial networks (such as AKSANSI, other associations, KSM communities of practice, any future group of operation facilitators, etc) can help develop coordination across districts and achieve efficiency benefits of aggregation.
Co-management between LG and CBOs	In this guidance, co-management refers to a process where-by local government increases their share of responsibilities, prioritising those aspects of the **operation phase** that CBOs find most difficult, as well developing and promulgating clear access mechanisms for communities.
Specific support for KSMs	
Authority in tariff setting and fee collection	Many CBOs struggle financially. Providing authority and legitimacy for CBOs or local leaders at village, neighbourhood, or regional level to (a) set tariffs at operational cost-recovery and (b) formalize fee collection processes, is an essential step. It could happen through local regulation.
Matching innovative financing to need	Local government and designers of community-scale programs can help link KSMs and/or households with innovative financing mechanisms (e.g. micro-finance, credit cooperatives, corporate social responsibility). These funds can be used e.g., by households to fund their system connection, or KSMs to retrofit communal systems to simple sewer systems, to expand service delivery and therefore revenue potential, or for intermittent and asset renewal costs.
Building innovation entrepreneurs	Many strategies and initiatives are possible whereby KSMs improve the efficiency and desirability of the service, maximise benefits afforded by the presence of the system, and create additional revenue streams. This research uncovered many examples of such innovation (see accompanying Visual Presentation).

Specific next steps for national government and its partners in order to assist local governments to accept and operationalise the proposed minimum responsibilities

1. Develop a national expenditure policy for local government, specifying how funds can be used to support operation.

2. Use the outcomes of our legal review to draft and implement local regulations to specify sanitation services in line with co-management and institution-led approaches for governance of local scale sanitation.

3. Explore guidance for local government to either take on asset ownership or facilitate the highest form of land ownership for KSMs.

4. Support local government to coordinate information and monitoring for improving efficacy of resource use and demonstrate performance. Create positive incentives for monitoring.

5. Strengthen links between site selection and need: Explore potential guidance for local government to use the Pathogen Hazard Diagram to identify real risks from existing sanitation systems, including cesspits (cubluks) and identify where to locate simple sewer systems to reduce pathogen exposure risk.

6. Create guidance for local government to help optimize existing investments (e.g., connect additional households to under-utilised treatment systems as quick strategy to double coverage).

Project Outputs:

Final Report

Mitchell, C and Ross, K. 2016. *Findings and Recommendations. A synthesis for key stakeholders in community scale sanitation in Indonesia* (this report) Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme (ADRAS) Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Mitchell C, Ross K, Puspowardoyo P, Wedahuditama F. 2016. *Governance of local scale sanitation: Visual Synthesis Report for key stakeholders in Indonesia.* Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Mitchell, C., Ross, K. and Wedahuditama F. 2016. *A Policy Brief for Government of Indonesia Ministerial Stakeholders*. Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Guidance Material

Mitchell, C, Ross, K, Puspowardoyo P, Rosenqvist, T, and Wedahuditama F. 2016a. *Governance of local scale sanitation: How to design governance for lasting service? Explanatory notes to accompanying presentation. Guidance Material: Introduction*. Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme (ADRAS) Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Mitchell C, Ross K, Puspowardoyo P, Rosenqvist T, and Wedahuditama F. 2016b. *How to design governance for lasting service? Visual resource for workshop, guided stakeholder discussion and group/individual reflection*. Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Research Papers

Ross K, Abeysuriya K, Mikhailovich N, and Mitchell C. 2014. *Governance for decentralised sanitation: Global Practice Scan. A working document.* Prepared by the Institute for Sustainable Futures, University of Technology Sydney as part of the Australian Development Research Award Scheme (ADRAS).

Mitchell, C, Ross, K, and Abeysuriya, K. 2015. *An analysis of performance data for local scale wastewater services in Indonesia*. Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme (ADRAS) Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Mason, N, Ross, K, and Mitchell, C, 2015. *A case study analysis of formal and informal institutional arrangements for local scale wastewater services in Indonesia*. Prepared by the Overseas Development Institute and the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme (ADRAS) Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Mitchell, C, Abeysuriya, K, Ross K. 2016. *A review and comparative analysis of indicative service costs for different sanitation service scales in Indonesia*. Prepared by the Institute for Sustainable Futures, University of Technology Sydney, as part of the Australian Development Research Award Scheme (ADRAS) Project: Effective governance for the successful long-term operation of local scale wastewater systems.

Al'Afghani, MM, Paramita, D, Mitchell, C, Ross, K. 2016. *Review of Regulatory Framework for Local Scale "Air Limbah".* Prepared by the Center for Regulation, Policy and Governance, Universitas Ibn Khaldun Bogor and Institute for Sustainable Futures, UTS under the Australian Development Research Award Scheme (ADRAS).

Publications

Mitchell C, Abeysuriya K, and Ross K. 2016. 'Making pathogen hazards visible: a new heuristic to improve sanitation investment efficacy'. *Waterlines* vol 35 no 2, April 2016. Practical Action Publishing, United Kingdom. Available at http://www.developmentbookshelf.com/doi/pdf/10.3362/1756-3488.2016.014

Mitchell, C. and Ross, K. 2016. 'Trandisciplinarity in action: Four guidelines, a reflexive framework and their application to improving community sanitation governance in Indonesia'. in Fam, D., Palmer, J., Reidy, C. & Mitchell, C.. (eds), *Transdisciplinary Research and Practice for Sustainable Outcomes*. in Fam, D., Palmer, J., Reidy, C. & Mitchell, C. (eds) Routledge, United Kingdom

Rosenqvist, T., Mitchell, C. & Willetts, J., 2016. A short history of how we think and talk about sanitation services and why it matters. Journal of Water, Sanitation and Hygiene for Development, pp.1–16. Available at: http://washdev.iwaponline.com/cgi/doi/10.2166/washdev.2016.118.

Ross, K., Abeysuriya, K. & Mitchell, C. 2015. 'Developing principle-based targets and indicators for the SDGs'. 3rd Annual International Conference for Sustainable Development. New York, September 2015.

For all project outputs, visit: **http://communitysanitationgovernance.info**