Adaptive asset management

A pathway to better stormwater management and its economic, environmental, and social outcomes

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Why are so many in bad shape?
Lots of them.

Spread out across government areas.
They’re complex.

Lots of interconnected components working together to do lots of things.

Image source: Renew Solutions Pty Ltd
Figure 2 Components of a typical bioretention system
When do I clean my asset?

Is it improving stormwater quality?

When do I flush out underdrains?

How often should it be weeded?

How much money do I need to maintain it?

How can I fix it?

How will it cost to repair?

Is it reducing stormwater quantity?

What’s its lifecycle costs? Is it cost-effective?

What’s its remaining useful life?

Should I upgrade it?

Should I renew it?

Will the repair fix it?

Does the public like it?

Should I decommission it?
How do we work out how to manage these things?
Monitoring!

Collect the right data and info.

Image source: Renew Solutions Pty Ltd
**Performance**
Is it doing what it’s designed to do?

**Outcomes**
Is it achieving desired economic, environmental, and social outcomes?

**Requirements**
How do we manage and maintain it? How much will it cost?
How do we manage our assets so that they perform as intended and achieve desired outcomes... now and into the future?
IRL, we don’t know...

Where’s the evidence?

¯\_(ツ)_/¯
Why don’t we know?
Disconnected and uncoordinated research, management, and technology.
Research and monitoring
Little to no research and monitoring to answer question.

Management
Little to no monitoring to answer question.

Technology
Little to no technology developed to support monitoring and evidence-based management.
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<th>State</th>
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## Authority Stormwater Asset Management Plans

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What can be done about this?
Adaptive asset management

Connects research to management with technology.

Based on Infrastructure asset management (IPWEA, 2015) and adaptive environmental management (Allen & Stankey, 2009).
Adaptive asset management
What’s involved?

1. Adaptive asset management network (AAMN)
2. Long-term adaptive monitoring program (LAMP)
3. Adaptive asset management system (AAMS)

Image source: Renew Solutions Pty Ltd
Adaptive asset management network

Governments, industry groups, universities, others.

1. Guiding research and monitoring by identifying info needs and questions
2. Guiding technology development by specifying functionality for AAMS
Adaptive asset management network

What they do.
Long-term adaptive monitoring program

Network’s universities, industry groups, others.

1. Address network’s info needs and questions
2. Develop monitoring protocols and management models to support AAMS functionality

Based on adaptive monitoring (Lindenmayer & Likens, 2009).

Image source: Renew Solutions Pty Ltd
Long-term adaptive monitoring program

Conceptualise, develop, implement, and apply monitoring program.
Long-term adaptive monitoring program

What they do.
Adaptive asset management system

Asset owners, managers, maintenance staff, others.

1. Use the system to drive evidence-based management (e.g. answer the question)
2. Provide feedback to the AAMN and LAMP
Adaptive asset management system
What they do.
Adaptive asset management system (AAMS) functionality

Monitoring
- Long-term adaptive monitoring program
  - Management monitoring
    - Operation and maintenance monitoring

Evaluation and Prediction
- Management modelling

Planning
- Management planning
  - Customer level of service valuation

Implementation
- Management implementation

System input
System process
Adaptive management
Adaptive asset management system (AAMS) functionality

Monitoring
- Long-term adaptive monitoring program
  - Monitoring protocols for variables explaining performance, outcomes, and requirements are derived from the LAMP and embedded into the AAMS's mobile operation and maintenance monitoring app.
  - Monitoring on some assets (as per LAMP experimental design)
  - Monitoring and reporting on all assets using mobile operation and maintenance monitoring app.

Evaluation and Prediction
- Management models (performance, outcomes, requirements)
  - Performance, outcomes, and requirements models are calibrated for each asset using operation and maintenance monitoring.

Planning
- Customer level of service valuation
  - Management planning
    - Management implementation

System input
System process
Adaptive management
Continuously improved LAMP outputs
Information.
How do we **manage** our assets so that they **perform** as intended and achieve desired **outcomes**... now and into the future?
Adaptive asset management system
Assetlogue.com

Image source: Renew Solutions Pty Ltd
PCD046
Adjacent HN 62 Romley Crescent, eastern side of Rooty Hill Road North, end of Romley Crescent in pedestrian pathway, NSW 2761

PCD046-AI-2

Inspection Report

Asset Condition

- POOR
- GOOD
- PERFECT

Depth to Pollutants: 1200 mm

Hydrocarbons?:

Comment

Gross Pollutants: 37%

Sediment: 36%

Organic: 11%

INCOMPLETE

PCD046-AI-3
Maintenance report required

Done

COMPLETE
Pathway for evidence-based management policy, design, and practice in QLD

Management Policy

State Planning Policy

Management Design

Living Waterways Framework

Management Practice

Adaptive Asset Management

Continual improvement via adaptive management of built and natural assets responsible for delivering triple bottom line services to communities.
Takeaways
That was a lot... so what’s important?

1. Many assets are in bad shape
2. 1) lots of them and 2) complex
3. Management doesn’t involve monitoring
4. Disconnected and uncoordinated research, management, and technology
5. Adaptive asset management may offers solutions

Image source: Renew Solutions Pty Ltd
References


Questions?

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